NEW AND LITTLE-KNOWN LAELAPTIDAE, TROMBICULIDAE AND LISTROPHORIDAE (ACARINA) FROM AUSTRALASIAN MAMMALS.

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(Sixty-two Text-figures.)

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Synopsis.

Seventeen new species of mites parasitic on Australasian marsupials, rodents and bats are described in the families Laelaptidae, Trombiculidae and Listrophoridae. Two previously unknown males are also described, and additional host and locality data for 23 little known species are given.

In the Laelaptidae, nine new species are described: *Haemolaelaps quartus*, n. sp., from a rat-kangaroo, *Aepyprymnus rufescens*, New South Wales; *Haemolaelaps ulysses*, n. sp., from a ring-tailed possum, *Pseudocheirus peregrinus laniginosus*, Victoria; *Laelaps breviseta*, n. sp., and *L. mackerrasi*, n. sp., from the allied rat, *Rattus assimilis*, north Queensland; *Laelaps calabyi*, n. sp., from a native mouse, *Pseudomys higginsi*, Tasmania; *Neolaelaps vitzthumi*, n. sp., from a fruit-bat, *Pteropus scapulatus*, Northern Territory; *Pneumonyssus dentatus*, n. sp., from a marsupial mouse, *Antechinus flavipes godmani*, and a scale-tailed rat, *Melomys cervinipes*, north Queensland; *Raillietia australis*, n. sp., from the common wombat, *Phascolomis mitchelli*, New South Wales; *Trichosurolaelaps harrisoni*, n. sp., from the musk rat-kangaroo, *Hypsiprymnodon moschatus*, north Queensland.

New records are given for *Australolaelaps mitchelli*, *Gymnolaelaps annectans*, *Haemolaelaps domrowi*, *H. marsupialis*, *Hirstionyssus musculi*, *Ichoronyssus aristippe* (male described for first time), *Laelaps assimilis*, *Mesolaelaps antipodianus*, *M. australiensis*, *M. bandicoota*, *M. sminthopsis*, *Neolaelaps spinosus*, *Peramelaelaps bandicoota*, *Spinolaelaps miniopteri*, *Trichosurolaelaps crassipes*, *T. emanuelae* and *T. striatus*.

In the Trombiculidae, two new species are described: *Trombicula alicola*, n. sp., from a bat, *Rhinolophus megaphyllus*; *Neotrombicula comata*, n. sp., from a marsupial bandicoot, *Isoodon macrourus*.

New records are given for *Guntherana andromeda*, *G. philippensis*, *G. cassiope* and *G. kallipygos*.

In the Listrophoridae, six new species are described: *Austrochirus mcmillani*, n. sp., from a marsupial bandicoot, New Guinea; *Austrochirus trouessarti*, n. sp., from a marsupial mouse, *Antechinus flavipes godmani*, north Queensland; *Cytostethum mollisoni*, n. sp., from a rat-kangaroo, *Potorous tridactylus*, Tasmania; *Cytostethum clibanarius*, n. sp., from a rat-kangaroo, *Aepyprymnus rufescens*, north Queensland; *Cytostethum parvum*, n. sp., and *C. moschati*, n. sp., from the musk rat-kangaroo, *Hypsiprymnodon moschatus*, north Queensland.

New records are given for *C. promeces* and *C. pseudocharactum*, the male of the latter being described for the first time.

During the past two years, Dr. J. L. Harrison, at the Institute's Field Station, has been studying the ecology of the small mammals of the Innisfail district in north Queensland, as part of a wider investigation of the epidemiology of leptospirosis in that area. It has been an integral part of this work that collections of ectoparasites have been made from the mammals brought into the laboratory, the result being a very large collection, which has come to me for study. It has included numerous new species, some of which are described here as a preliminary to a distributional analysis of the material.

The opportunity has also been taken to include a number of other new species and new host and distributional records in these families, based mainly on material received from Mr. J. H. Calaby, C.S.I.R.O. Wildlife Section, Canberra, and Dr. Bruce McMillan, School of Public Health and Tropical Medicine, Sydney.

Family LAELAPTIDAE.

The family is taken in the sense of Vitzthum (1940–43), and the genera and species are arranged alphabetically.

Genus Australolaelaps Womersley.

Australolaelaps mitchelli Womersley, 1956.

A second record of this species, originally described from the dama pademelon, *Thylogale eugenii* (Desmarest) (Macropodidae) in South Australia, is eleven females from the black-striped wallaby, *Protemnodon dorsalis* (Gray), Mt. Lindesay, S.E.Q., 24.iv.1960, J. H. Calaby and party.

Genus Gymnolaelaps Berlese.

Gymnolaelaps annectans Womersley, 1955.

This species is probably a nidophile rather than a true parasite, and may prove to belong in *Laelapsis* Berlese. It was originally recorded from the nests of mutton birds, and associated with *R. rattus* (Linné). I have since seen the following material: 1♀ off rabbit (*Oryctolagus cuniculus* (Linné)), Exmouth, N.S.W., 17.v.1955, E. J. Waterhouse; 1♀ off rabbit, "Cherry Hill", Uralla, N.S.W., 2.vi.1955, E.J.W.; 1♀ off hare (*Lepus europaeus* Pallas), Chiswick, 10 miles south of Armidale, N.S.W., 5.vii.1955, E.J.W.; 5♀♀ from *R. norvegicus* (Berkenhout), Unley Park, S.A., ACC 240, 19.xi.1950, R. V. Southcott.

Genus Haemolaelaps Berlese.

Haemolaelaps domrowi Womersley, 1958.

This species was originally described from the long- and short-nosed bandicoots, *Perameles nasuta* Geoffroy and *Isoodon macrourus* (Gould)[1] (Peramelidae), from Queensland, and has since been recorded from *I. m. moresbyensis* (Ramsay) and another bandicoot, *Peroryctes raffrayanus raffrayanus* (Milne-Edwards) from Papua by Domrow 1958*a*). I have since seen a further four females from *I. m. moresbyensis*, within five miles of Port Moresby, Papua, Sept. 1959, I. Cook, while the following records extend the known southward range: numerous specimens, *I. macrourus*, Tooloom, N.S.W., 19.viii.1960, J. H. Calaby; 3♀♀, *Perameles gunnii* Gray, Guildford Junction, Tasmania, 21.iv.1959, B. C. Mollison.

Haemolaelaps marsupialis Berlese, 1910.

This species was originally described from a bandicoot from Sydney, and has since been recorded from *Perameles nasuta* and *Isoodon macrourus* from Queensland by Womersley (1958). The following records extend the known range southward: 9♀♀, *I. macrourus*, Tooloom, New South Wales, 20.ii.1960, J. H. Calaby; 29♀♀, *Perameles gunnii*, Guildford Junction, Tasmania, 21.iv.1959, B. C. Mollison; 14♀♀, *I. obesulus* (Shaw), Maydena, Tas., 17.xii.1959, T. Anderson.

Haemolaelaps quartus, n. sp. (Figs 1–2, 8).

Types: Holotype female in Division of Entomology, C.S.I.R.O., Canberra, in Hoyer's medium; from a rat-kangaroo, *Aepyprymnus rufescens* (Gray) (Macropodidae), Peacock Creek, Bonalbo, N.S.W., 8.viii.1960, J. H. Calaby.

Female.—A large, stout species, length of idiosoma 980μ in slightly distended specimen.

Dorsum: Dorsal shield without distinct reticulate striae (as are the ventral shields), rather small, leaving a broad band of lateral and posterior cuticle uncovered. Setae on dorsal shield of two distinct types, the 18 lateral pairs being four to five times as long as the 14 minute discal pairs. Dorsal cuticle very hairy, with about 50 setae on each side.

Venter: Sternal shield rather weak, with lateral and posterior margins concave; with six setae and four well-marked lyriform pores. Metasternal setae and pores present. Genital plate much reduced, its margin discernible by the cessation in cuticular striae rather than by a definite edge. It extends only as far as the second pair of ventral setae usurped by the genitoventral plate in *Laelaps*. One pair of rather short genital setae are present. Genital operculum longitudinally striate at level of metasternal complex, and reaching forward over posterior border of sternal shield. Anal plate

[1] The nomenclature of this species and *I. obesulus* (Shaw) is discussed by Mackerras and Mackerras (1960).

roundly arched anteriorly, but more angular posteriorly; with three subequal anal setae as figured. Ventral cuticle with weakly defined metapodal plates, and about 25 pairs of setae. Peritremes reaching forward to level of coxae I; stigmata simple; peritremalia extended slightly behind stigmata, with a pore, but not fused with articulatory lunule behind coxae IV.

Legs: Coxal setal formula 2.2.2.1, all setae being completely unmodified. Without stronger setae dorsally on femora I & II. Most setae on legs, posterolateral body cuticle, and margins of dorsal shield minutely barbed. Setae on sternal and genital plates nude, but those on anal plate also barbed.

Text-figs 1-2.—*Haemolaelaps quartus*, n. sp. Female. 1, Venter; 2, Dorsum. (In all figures, one division of the scale equals 100μ.)

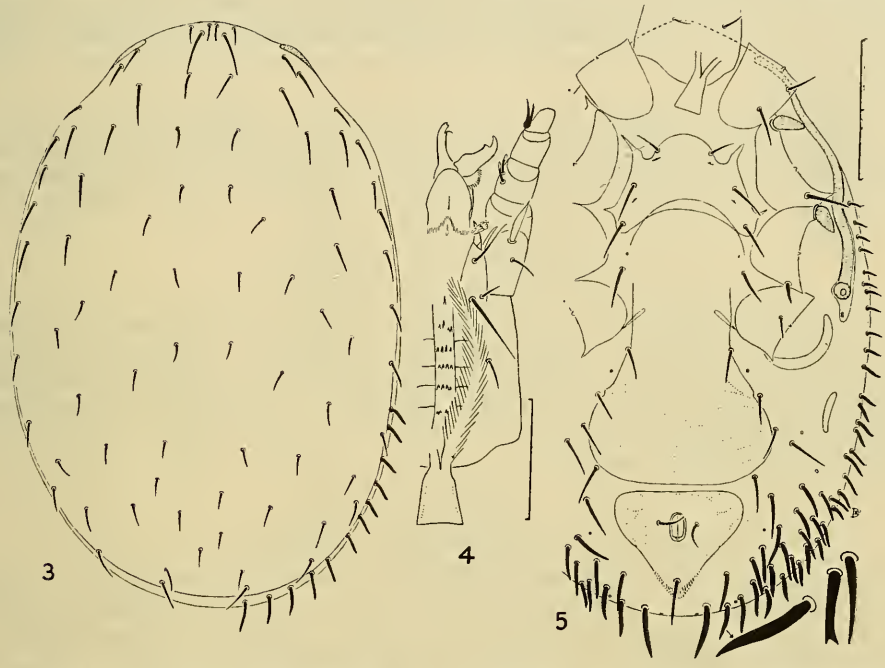
Gnathosoma: Tritosternal base strongly barbed laterally; laciniae normal, extending forward to base of hypostome. All hypostomal and gnathosomal setae subequal, except rather smaller outer posterior hypostomals. Labial cornicles not as strongly developed as in *Laelaps*. Salivary stylets present. Deutosternum with seven groups of 1–4 minute denticles. Palpi slender, with bifurcate tarsal claw. Two setae on inner face of genu clavate (this character is also present at least in *H. marsupialis* and *H. domrowi*). Chelicerae as in genotype; movable finger with two weak teeth, and surrounded basally by weakly defined corona; fixed finger edentate, with flagelliform, but basally slightly inflated pilus dentilis.

Notes.—Haemolaelaps quartus, n. sp., is the fourth species to be assigned to the *marsupialis* complex as treated by Womersley (1958). These four species are all Australian, and are characterized by the strongly barbed tritosternal base, and the flagelliform pilus dentilis. The three known species (*H. marsupialis* Berlese, genotype; *H. flagellata* Wom.; *H. domrowi* Wom.) have 39 pairs of setae on the dorsal shield, and a well-developed genital plate (noticeably expanded behind coxae IV, and extending back as far as the third pair of ventral setae usurped by the genitoventral shield in *Laelaps*).

In *H. quartus*, there are only 32 pairs of setae on the dorsal shield, and the genital plate is scarcely expanded at all behind coxae IV (extending back only as far as the second pair of ventral setae usurped in *Laelaps*).

HAEMOLAELAPS ULYSSES, n. sp. (Figs 3–5).

Types: Holotype female in Queensland Museum, Brisbane, and two paratype females each in Department of Zoology, University of Melbourne; British Museum (Natural History), London; U.S. National Museum, Washington, D.C. All seven specimens are in Hoyer's medium, and were taken from the ears of a ring-tailed possum, *Pseudocheirus peregrinus laniginosus* (Gould) (Phalangeridae), Warramate Hills, near Lilydale, Victoria, J. A. Thomson, 17.vii.1960.



Text-figs 3-5.—*Haemolaelaps ulysses*, n. sp. Female. 3, Dorsum; 4, Gnathosoma; 5, Venter, with insets showing posterolateral body seta and two setae from femur IV. These are at twice the scale indicated for the gnathosoma.

Female.—A pale brown, well-sclerotized species with idiosoma 814–847μ (av. 829) long.

Dorsum almost entirely covered by dorsal shield, except for extremely narrow posterolateral strip. All dorsal setae short and evenly tapering, arranged in regular pairs, except in posterior quarter; about 40 pairs of setae are present on the shield. Marginal cuticle with about 12 pairs of stronger setae similar to those on venter.

Venter: Sternal shield small, and of characteristic shape. Anterior margin with two semicircular concavities outside sternal setae I, but strongly arched medially. Posterior margin also strongly concave. The usual three pairs of setae and two pairs of pores are present on the shield. Metasternal setae and pores free in cuticle. A pair of weak internal sclerotizations are present between coxae IV. Genitoventral plate expanded behind coxae IV, with only one pair of setae on the shield, but closely flanked by another three pairs. Anal plate large, and well sclerotized, with anus and three anal setae as figured. Both the genital and anal shields bear linear striations as shown. Metapodal plates well marked, elongate. Ventral cuticle with

several minute sclerotized plaques, and about 45 pairs of strong setae. The lateral setae are spinose, but more posteriorly the setae are peculiarly curved. Peritremal structures typical of the genus, and not fused with articulatory lunule behind coxae IV.

Legs rather stout, with stronger setae on tarsi II-IV. All tarsi with caruncle and two claws. Femora I & II without elongate setae dorsally. Anterior seta on coxae II & III much expanded, and very blunt. Otherwise undistinguished, except for several apically bifurcate setae along the anterodorsal face of the central segments of all four legs.

Gnathosoma: Tritosternal base not dentate laterally; laciniae strongly ciliated. Labial cornicles fairly well developed. Hypostomal and gnathosomal setae as figured. Deutosternal groove with five transverse rows of about four denticles each, and a single anterior denticle. Hypostomal processes, epipharynx, and salivary stylets as figured. Chelicerae with both digits dentate; fixed digit with weak pilus dentilis. Palpi undistinguished, except for clavate setae on genu, and foliate seta on trochanter. Palpal claw two-tined.

Notes.—Haemolaelaps ulysses, n. sp., may be immediately recognized by its peculiar sternal shield, its large genital and anal shields, and the setation of the coxae and palpal trochanter. In these respects, it is not typical of the genus *Haemolaelaps*, although it falls here both in Strandtmann and Wharton's (1958) and Tipton's (1960) keys.

Genus Hirstionyssus da Fonseca.

Hirstionyssus musculi (Johnston, 1849).

The following specimens have been identified according to Bregetova (1956): 6♀♀, *Mus musculus* Linné, Mt. Tyson, near Toowoomba, Queensland, 30.vii.1959, E. H. Derrick (associated with *Mesolaelaps australiensis* Hirst); 1♀ and 1 nymph, *Rattus rattus*, Yarralumla, Australian Capital Territory, 7.iii.1960, J. H. Calaby. The specimens recorded from *M. musculus* by Womersley (1956) as *H. arcuatus* (Koch, 1839) are also conspecific with the above material.

Genus Ichoronyssus Kolenati.

Ichoronyssus aristippe Domrow, 1959 (Figs 6, 7).

Types: Allotype male in Queensland Museum, Brisbane, collected with one nymph of the same species, and three nymphs of a related, but much hairier species, on the type host, a bat, *Miniopterus schreibersii blepotis* (Temminck) (Vespertilionidae), Bonalbo Colliery, Bonalbo, N.S.W., 17.viii.1960, J. H. Calaby.

Male.—About same size as female, idiosoma 696μ long in somewhat distended condition.

Dorsum: Dorsal shield parallel-sided in anterior three-quarters, but tapering and truncate posteriorly; with pattern of reticulate striae and pores. Sixteen pairs of elongate marginal setae are present on the shield, one pair less than is usual in the female. In addition, there are normally sixteen minute discal setae present (one of these is absent in the allotype, but these minor variants are to be expected). Marginal cuticle not as hairy as in female, with only six setae on each side.

Venter: All ventral shields with reticulate striae. Intercoxal shield terminating roundly at level of posterior margin of coxae IV; with five pairs of setae and three pairs of pores. Ventral shield irregular in outline, and fused posteriorly with anal shield; with two pairs of usurped setae. Anal shield also irregular in outline, elongate, and with usual three setae and barbules as shown. Ventral cuticle with fourteen setae arranged 8.6. Peritremes reaching forward to middle of coxae II; peritremalia fused with articulatory lunule behind coxae IV.

Legs: Femora and genua I & II with one or two stronger setae dorsally. Coxae II-IV with crescentic striae in posterior half. Anterodorsal process on coxae II with retrorse spine on external edge, as in female.

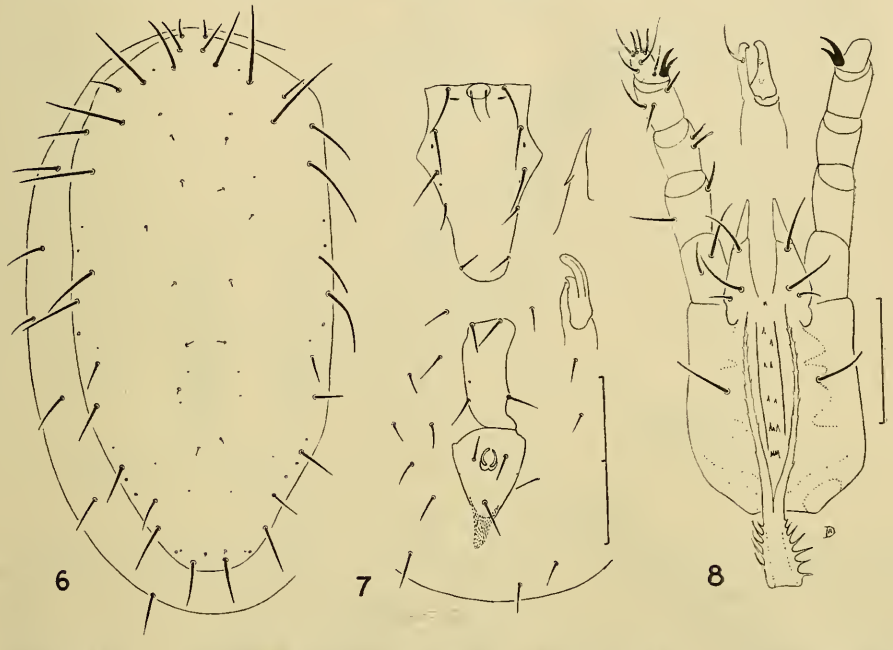
Gnathosoma: Palpal trochanter modified on ventro-internal margin. Chelicerae with fixed finger weak and edentate. Movable finger with single weak tooth. Spermatodactyl somewhat longer than movable finger, and curved apically.

Nymph.—The stage originally illustrated is the protonymph, and has four platelets between the antero- and posterodorsal shields. On the posterodorsal shield, the posterior pair of setae set outside the larger pair may be somewhat stronger than figured.

Genus Laelaps Koch.

Laelaps assimilis Womersley, 1956.

This species is common on the type host, the allied rat, *Rattus assimilis* (Gould), in Queensland. The following are new hosts and localities: numerous specimens of both sexes from *R. assimilis*, Palen Ck., S.E. Queensland, 18.v.1960, I. Cook and R.D.; *R. lutreolus velutinus* (Thomas), Florentine Valley, Tasmania, 7.vii.1959, B. C. Mollison; *R. l. velutinus*, Depot Bridge, Maydena, Tas., 7.ix.1959, B.C.M.



Text-figs 6-7.—*Ichoronyssus aristippe* Domrow. Male. 6, Dorsum; 7, Venter, with insets showing chelicera and anterodorsal process of coxa II. These are at twice the indicated scale.
Text-fig. 8.—*Haemolaelaps quartus*, n. sp. Female. Gnathosoma.

Laelaps brevisèta, n. sp. (Figs 9–11).

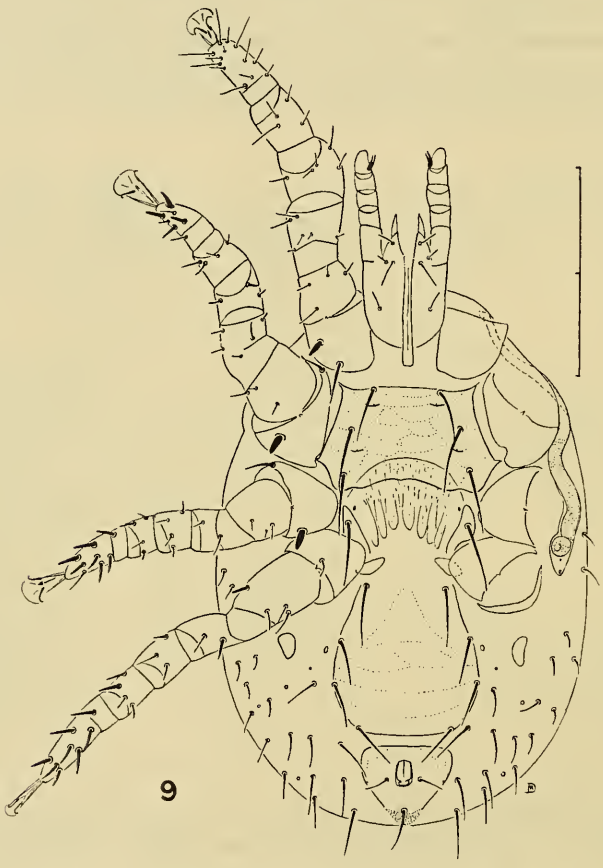
Types: Holotype female in Queensland Museum, Brisbane, and one paratype female in Queensland Institute of Medical Research, Brisbane. Both these specimens are in Hoyer's medium, and were collected on an allied rat, *Rattus assimilis* (Gould) (Muridae), trapped alive in rain-forest, Dinner Ck., near Innisfail, north Queensland, 23.ix.1959, J. L. Harrison. An additional seven paratype females have been distributed between this Institute; British Museum (Natural History), London; U.S. National Museum, Washington, D.C. These are in polyvinyl alcohol-lactophenol, and were taken from the same host and locality, 21.x.1959, 16.xii.1959, and 19.v.1960, J.L.H.

Female.—A rather small, broadly oval species, with stout legs. Length of idiosoma in mounted specimens 490–517μ.

Dorsum: Dorsal shield broadly oval, covering entire dorsum except for extremely narrow lateral strip; with 39 pairs of setae. All these setae are very short, except for

the verticals and the extreme posterior pair. On the disc, the setae are barely one-quarter as long as the interval between their bases. A regular system of pores is present.

Venter: Sternal shield wider than long, with posterior margin weakly concave and slightly irregular; with usual six setae and four pores. Metasternal setae set on distinct platelets, but metasternal pores free in cuticle. With pair of oval internal sclerotizations between coxae IV. Genitoventral plate as wide as long (see Domrow, 1958*a*), with setae barely as long as interval between their bases. Genital operculum striate, reaching forward to level of sternal setae III. Anal plate narrowly separated from genitoventral plate, broad, and with setation as figured. Metapodal plates distinct.



Text-fig. 9.—*Laelaps breviseta*, n. sp. Female. Venter.

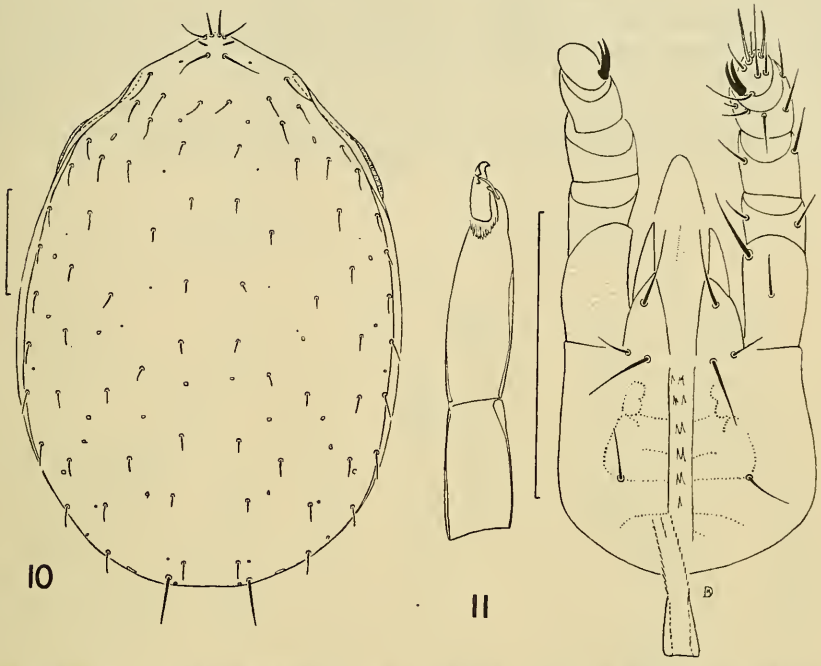
All ventral plates with striae as figured. Ventral cuticle with about 15 pairs of setae, which increase in length posteriorly. Peritremalia not extending around posterior margin of coxae IV; with two small pores.

Legs: Coxal setal formula 2.2.2.1, the anterior seta of coxae I and the posterior setae of coxae II and III being markedly thickened and spine-like. Femora I & II dorsally with two and one longer setae, respectively. Tarsi II-IV with spinose setae. All tarsi with caruncle and two claws.

Gnathosoma: Tritosternum apparently normal. Outer posterior pair of hypostomal setae about half as long as other two pairs, which are also slightly longer than the gnathosomal pair. Deutosternum with about five duplex denticles, and one single denticle posteriorly. Labial cornicles well developed. Epipharynx evenly tapering, but

slightly rounded distally; groove not reaching apex. Chelicerae typical. Palpi undistinguished, with bifurcate tarsal claw.

Notes.—In my key (1958*a*) to the Australasian species of *Laelaps*, *L. breviseta* comes nearest to *L. nuttalli* Hirst. It may be easily separated from this species by the relative proportions of the dorsal, genitoventral and anal shields, and by the great disparity in size of the dorsal and genitoventral setae.



Text-figs 10-11.—*Laelaps breviseta*, n. sp. Female. 10, Dorsum; 11, Gnathosoma.

LAELAPS CALABYI, n. sp. (Figs 12–17).

Types: Holotype female, allotype male, and four paratypes of each sex in Division of Entomology, C.S.I.R.O., Canberra. These specimens are all in Hoyer's medium, while a further 80 paratype females and eleven paratype males in spirit, together with a few nymphs, have been distributed among Queensland Institute of Medical Research, Brisbane; South Australian Museum, Adelaide; South African Institute for Medical Research, Johannesburg; British Museum (Natural History), London; U.S. National Museum, Washington, D.C. These specimens are all from three native mice, *Pseudomys higginsi* (Trouessart) (Muridae), Dawson Settlement, Tasmania, 19.vi.1959, J. H. Calaby; Florentine Valley, Tas., 6.vii.1959, B. C. Mollison; Maydena, Tas., 8.vii.1959, B.C.M.

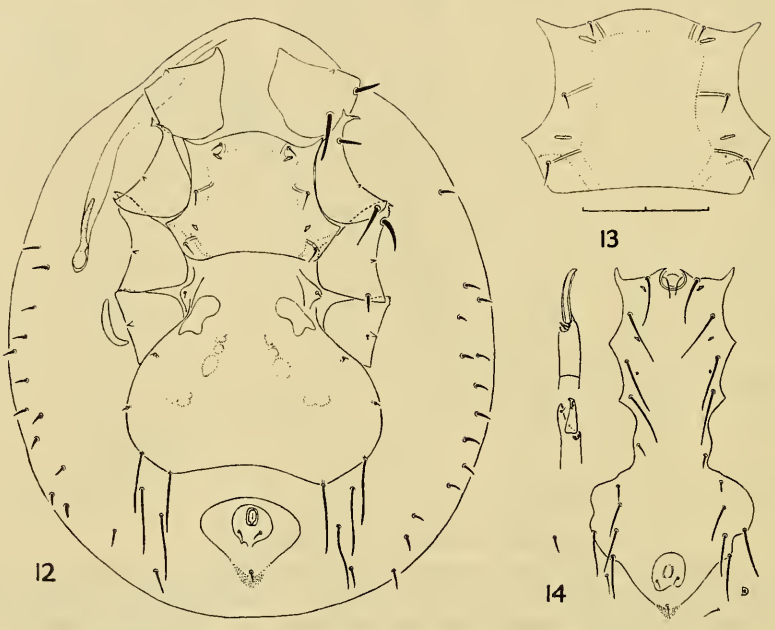
A further four females, four males and two nymphs from the first collection are in polyvinyl alcohol-lactophenol, and have not been included in the type series.

Female.—A dark, very broad, and almost subcircular species. Specimens of this sex may be rather sharply divided into two groups on size. The smaller averages 884μ (range 847–902), the larger averages 1,338μ (range 1,298–1,364). An occasional specimen may be smaller still, e.g., 792μ, or intermediate in size, e.g., 1,177μ. These measurements are the length of the idiosoma, taken from freshly mounted and little compressed material.

Dorsum: Dorsal shield emarginate posterolaterally, and somewhat truncate posteriorly; with 34 pairs of setae, all of which are very short except the posterior pair. A broad marginal band of cuticle is left uncovered, and bears five to seven pairs of

short setae. The inner half of this band, especially in larger specimens, is sclerotized, and quite distinct from the almost colourless outer half.

Venter: Sternal shield particularly well sclerotized marginally; slightly convex anteriorly and slightly concave posteriorly. With six very short setae and four pores as figured. Metasternal setae minute, but set on well-marked metasternal plates. Metasternal pores not detected. With internal sclerotization between coxae IV as figured. Genitoventral plate grossly expanded behind coxae IV, noticeably broader than maximum width of sternal plate, and slightly concave posteriorly. Anterior two pairs of genitoventral setae minute, and posterior two pairs very much longer. Anal plate about as broad as long, with three small subequal setae. Ventral cuticle with two pairs of sinuous setae like those on posterior half of genitoventral plate, in addition to 14 or 15 pairs of short spinose setae. Peritremal plate extending forward to beyond coxae I, but peritremes themselves abbreviated, and lying above coxae III.



Text-figs 12-14.—*Laelaps calabyi*, n. sp. Female. 12, Venter of smaller form; 13, Sternal plate of larger form; 14, Male holoventral shield, and chelicerae of both sexes.

Legs: Coxal setal formula 2.2.2.1, those on I-III all somewhat thickened, while that on IV is very minute. One very long seta dorsally on femora I, and one or two stouter setae on femora I & II and genu I.

Gnathosoma: Tritosternal base narrow, merging into two slender ciliated laciniae, which reach the level of the anterior hypostomal setae. All three pairs of hypostomal setae and gnathosomal pair subequal. Deutosternum with file of about six single denticles. Labial cornicles well developed. Epipharynx slightly clavate, uniformly spiculate ventrally, and with dorsal groove reaching apex. Chelicerae and palpi as usual.

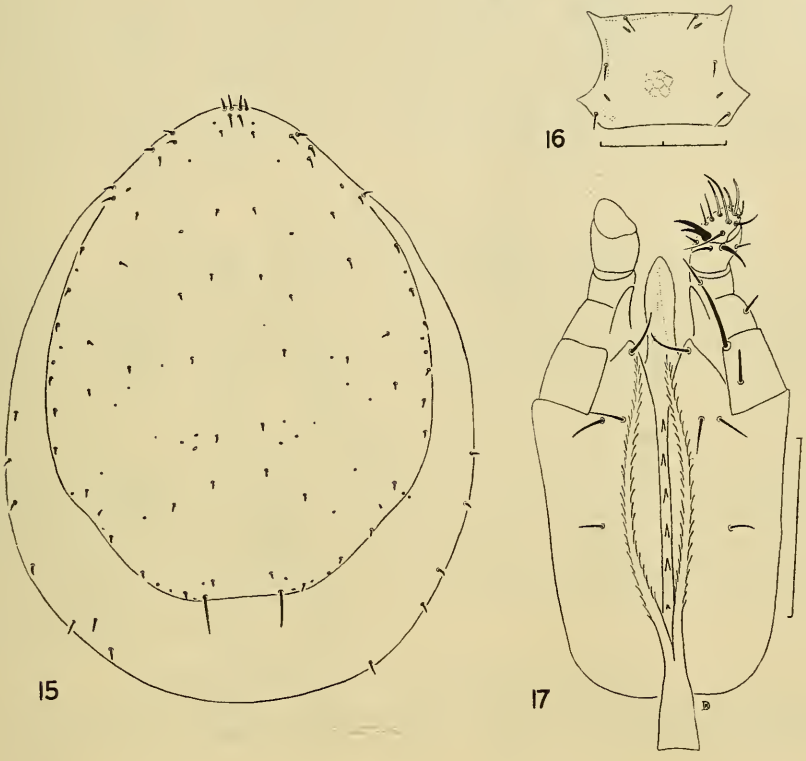
Male.—Length of idiosoma 704–1,034μ.

Dorsum as in female.

Venter: All ventral plates fused to form holoventral plate. Sternal and metasternal setae long and subequal. Genital and first pair of usurped ventral setae much shorter. Four pairs of long sinuous usurped ventrals are also present. One or two pairs of short setae are present on the ventral cuticle.

Legs and gnathosoma as in female, except for chelicerae. Spermatodactyl apparently tubular, about as long as middle segment of chelicerae, and weakly curved.

Notes.—Laelaps calabyi, n. sp., is closely related to *L. finlaysoni* Womersley, which was also described from native mice (*Pseudomys apodemoides* Finlayson and *P. minnie* Troughton), but in South Australia. I am grateful to Messrs. H. M. Hale and H. Womersley for the opportunity to examine three females and one male from the type series of *finlaysoni*. The two species share the following characters: peritremes much abbreviated; dorsal setae minute; anterior two pairs of genitoventral setae minute; setae on coxae I-III well developed, but that on IV minute; metasternal setae minute;



Text-figs 15-17.—*Laelaps calabyi*, n. sp. Female. 15, Dorsum of smaller form; 16, Sternal plate of a particularly small specimen; 17, Gnathosoma.

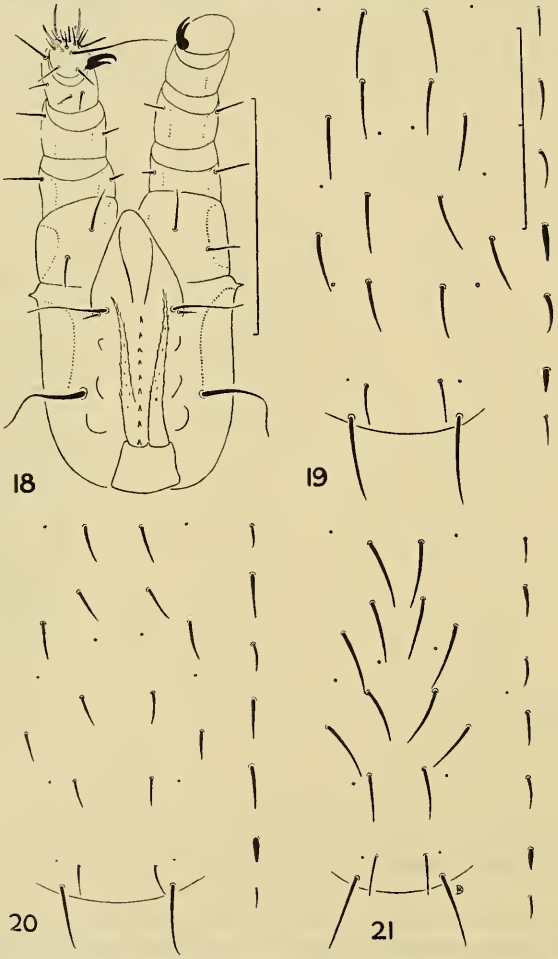
peculiar texture of sternal shield. They may also, however, be readily separated by several characters—the width of the genitoventral plate relative to that of the sternal plate; the proportions of the anal plate; and the length of the postanal seta relative to that of the adanals.

The occurrence of two sizes of females in *L. calabyi* has been noted above, but may be further analysed here. In the three series examined, the number of normal and giant specimens were respectively 13/1, 13/25 and 16/18. Only three specimens fell outside the two ranges. A similar phenomenon occurs in the related species *L. rothschildi* Hirst, but here the small form occurs almost exclusively on rats of the genus *Melomys*, while the giant form occurs on *Uromys*.

L. rothschildi is classified by Strandtmann and Wharton (1958) as a *Mysolaelaps*, and *L. calabyi* would also key out here in their system. However, they list *finlaysoni* as a *Laelaps*. I am not convinced that *Mysolaelaps* merits generic rank.

Laelaps mackerrasi, n. sp. (Fig. 20).

Types: Holotype female and five paratype females in Queensland Museum, Brisbane, from an allied rat, *Rattus assimilis* (Gould) (Muridae), rain-forest, Dinner Ck., near Innisfail, north Queensland, 10.vi.1959, J. L. Harrison. Thirty-one paratype females from the same host, habitat and locality have been distributed among the Queensland Institute of Medical Research, Brisbane; Division of Entomology, C.S.I.R.O., Canberra; South Australian Museum, Adelaide; South African Institute for Medical Research, Johannesburg; British Museum (Natural History), London; U.S. National Museum, Washington, D.C. The entire type series is in polyvinyl alcohol-lactophenol.



Text-fig. 18.—*Neolaelaps vitzthumi*, n. sp. Female. Gnathosoma.

Text-figs 19-21.—*Laelaps* spp. Posterior portion of dorsal shield of female, together with coxal setae. 19, *L. southcotti* Domrow; 20, *L. mackerrasi*, n. sp.; 21, *L. habrus* Domrow.

Female.—Generally as in *L. southcotti* Domrow, 1958*a* (Fig. 19), but somewhat smaller. Length of idiosoma in mounted specimens 660–682μ.

Dorsum: Dorsal shield with 39 pairs of setae, and regular pattern of pores. Setae on posterior half of disc 32–41μ long, i.e., one-half to two-thirds as long as the interval between them.

Venter: Genitoventral plate distinctly longer (165–178μ) than broad (147–156μ); width between fourth pair of setae 94–103μ, but occasionally as narrow as 80μ. Successive genitoventral setae longer than interval between them.

Legs: Coxal formula 2.2.2.1. All coxal setae unexpanded and tapering, except posterior seta on coxae III, which is distinctly thickened and spinose. Tarsi II-IV with several stronger setae. Femora I and II with two and one seta respectively on dorsal surface, which are twice as strong as adjacent setae.

Gnathosoma: Inner pair of posterior hypostomal setae twice as long as other two pairs. Gnathosomal pair intermediate in size. Deutosternal groove with about six denticles in single file, although the anterior denticle may be double. Labial cornicles well developed. Epipharynx tapering, with groove along entire length. Chelicerae, palpi and tritosternum as in *L. breviseta*, n. sp.

Notes.—I had for some time confused this species with *L. southcotti*, since both have simple setae on coxae I. However, the two species may be recognized by the relative lengths of the dorsal setae, and the armature of coxae II, as figured above. *L. southcotti* parasitizes the giant scale-tailed rat, *Uromys caudimaculatus* (Krefft), while *L. mackerrasi* is a parasite of the allied rat, *Rattus assimilis* (Gould). Another close relative is *L. habrus* Domrow, 1958*a* (Fig. 21), described from a bandicoot from Papua. All these three species have 39 pairs of dorsal setae, as do *L. nuttalli* Hirst, 1915, *L. assimilis* Womersley, 1956, *L. wasselli* Domrow, 1958*a*, and *L. breviseta*, n. sp., above.

Genus Mesolaelaps Hirst.

Mesolaelaps antipodianus (Hirst, 1926).

This species was originally described from *Perameles nasuta* from Sydney, and has since been recorded from *P. gunnii* (Victoria), *Isoodon obesulus* (South Australia), and rabbits (Tasmania) by Womersley (1937, 1956). I have since seen the following material: very numerous specimens from *P. nasuta*, Mt. Nebo, S.E. Queensland, 1.xii.1958, E. H. Derrick; 2♀♀, *I. obesulus*, Maydena, Tas., 17.xii.1959, T. Anderson.

Mesolaelaps australiensis Hirst, 1926.

This common species has been recorded from a variety of hosts in Australia, including the echidna, *Tachyglossus aculeatus acanthion* (Collett) (Tachyglossidae), the numbat, *Myrmecobius fasciatus* Waterhouse (Myrmecobiidae), the bandicoots *Perameles gunnii*, *P. nasuta*, and *Isoodon macrourus*, *Rattus lutreolus* (Gray), a "dasyurid", "rats" and "mice" (Womersley, 1937; Domrow and Smith, 1956; Domrow, 1958*a*). A further record is 12♀♀ from a native cat, *Dasyurus quoll* (Zimmermann), Maydena, Tasmania, 3.i.1959, B. C. Mollison.

Mesolaelaps bandicoota (Womersley, 1956).

This species was originally described from *I. macrourus* in S.E. Queensland. A further record from the same host is eighteen females, Tooloom, N.S.W., 19.viii.1960, J. H. Calaby.

Mesolaelaps sminthopsis (Womersley, 1954*b*).

This species is apparently restricted to dasyurid marsupials. It was originally described from *Sminthopsis leucopus* (Gray) in Victoria, and has since been recorded from *Antechinus flavipes* (Waterhouse) in Queensland by Domrow and Smith (1956). I have since seen 4♀♀, *A. flavipes*, Tuggolo State Forest, New South Wales, 21.iii.1960, J. Bromell; 4♀♀ (a fifth specimen was lost), *A. flavipes*, Wartook, Victoria, ACC 657, 5.i.1948, R. V. Southcott.

Genus Neolaelaps Hirst.

Neolaelaps spinosus (Berlese, 1910).

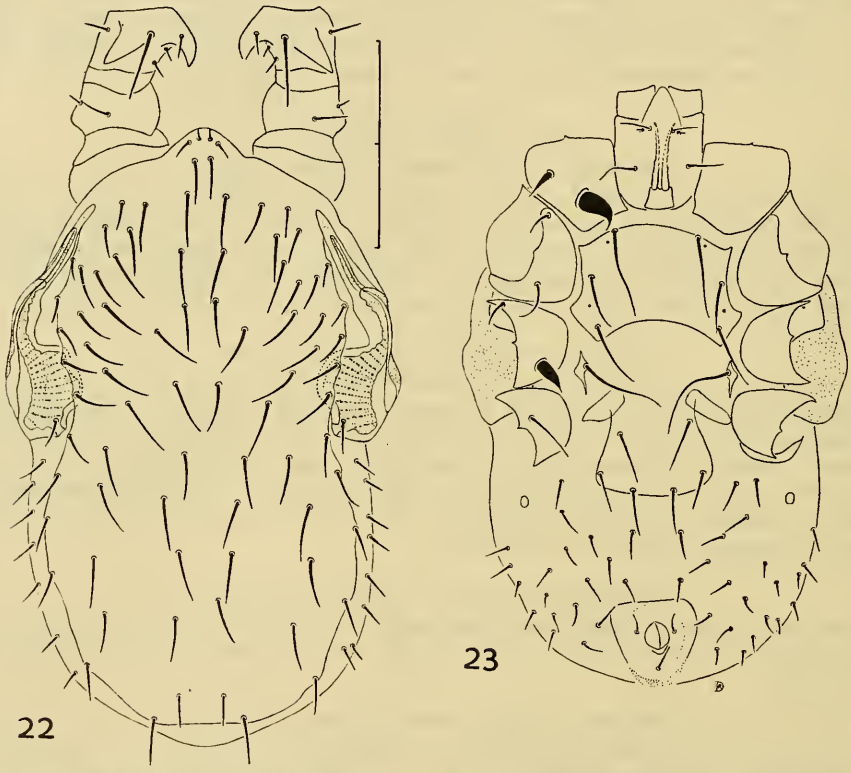
This species was originally described from fruit-bats of the genus *Pteropus* in Ceylon, Borneo, Java and Ambon. In addition to the material recorded from *P. conspicillatus* Gould in north Queensland (Domrow, 1958*a*), I have since seen two series of interest. The first of these was examined by the courtesy of Dr. B. McMillan. He told me that he was collecting parasitic Diptera from large black *Pteropus* at Poronbus, New Ireland, 7–10.viii.1958, and later noticed many mites in the tubes containing the

flies. These proved to be 146 specimens of all stages of *N. spinosus*. A total of fourteen flies was present in the tubes.

The second series has a similar history, and came from Dr. R. V. Southcott. He writes "this batfly had about twelve mites running over its dorsum. Fly and mites put into alcohol." I was only able to find two mites in the dried out tube, and these also proved to be Berlese's species. They have the same collection data as *N. vitzthumi*, n. sp., below, which was found "swarming" on the dead bat, "especially upon the dorsum of the ears".

NEOLAELAPS VITZTHUMI, n. sp. (Figs 18, 22–23).

Types: Holotype female and two paratype females in South Australian Museum, Adelaide. Twenty paratype females have also been divided between the collections of the Queensland Institute of Medical Research, Brisbane; Dr. R. V. Southcott, Adelaide; South African Institute for Medical Research, Johannesburg; British Museum (Natural



Text-figs 22-23.—*Neolaelaps vitzthumi*, n. sp. Female. 22, Dorsum; 23, Venter.

History), London; U.S. National Museum, Washington, D.C. The type series is in Hoyer's medium, and was collected from a fruit-bat, *Pteropus scapulatus* Peters (Pteropodidae), Adelaide River, Northern Territory, Australia, M 49, 10.vi.1943, R.V.S.

Four females and one nymph in polyvinyl alcohol-lactophenol, with the same collection data, have also been examined, while I have also seen a further three females in the South Australian Museum, *Pteropus gouldii* Peters, Townsville, Q., n.d., F. H. Taylor.

Female.—A stout-bodied, fairly well sclerotized species, with idiosoma in mounted specimens 539–572μ long.

Dorsum: Dorsal shield single, covering most of dorsal surface, except for narrow posterolateral strip. Lateral margins of shield noticeably concave as a result of enlargement of stigmata. Forty pairs of evenly arranged setae are present, as figured.

Marginal cuticle with about eight pairs of setae. Peritremes somewhat abbreviated, terminating at level of posterior margin of coxae I, and somewhat thickened in basal half. This thickened part merges quickly into an immense stigma, which is clearly open to the exterior. The texture of the stigmata is as figured.

Venter: Sternal plate wider than long, with evenly convex anterior margin, and evenly concave posterior margin. Three pairs of slender setae and two pairs of small pores are present on the shield. Metasternal plates fairly well developed, each with a long slender seta. Metasternal pores not detected. Genito-ventral shield a little expanded, but truncate behind coxae IV; with three pairs of setae. Anal plate roundly triangular, with anal setae arranged as figured, the postanal seta not being basally expanded. Ventral cuticle with about 20 pairs of short setae and two small metapodal plates.

Legs: Coxal formula 2.2.2.1. Coxae I with two spines, the posterior by far the stronger, and both merging into minute apical filament; coxae II with two normal setae; coxae III with normal anterior seta, but with strong posterior spine; coxae IV with normal seta. All trochanters with long slender seta on ventral surface. Genua and femora I & II each with one longer seta dorsally; femora III & IV each with one stronger seta dorsally. Femora I also with two strong retrorse spurs dorsally. Legs otherwise undistinguished.

Gnathosoma: Palpi fairly stout, with two-tined tarsal claw, and setation as figured. Only two pairs of hypostomal setae detected, the outer pair being much shorter than the inner pair. Gnathosomal setal pair slightly swollen basally, and with distal half very fine. Deutosternal groove with about nine denticles in single file. Tritosternum with rather broad base; laciniae evenly tapering, and very shortly barbed.

Deutonymph.—Length of idiosoma 407μ in mounted specimen.

Dorsum: Dorsal shield single, eroded midlaterally at level of stigmata, and indistinct posterolaterally; with about 33 pairs of setae. Stigmata and peritremes indicative of adult form.

Venter: Intercoxal shield terminating at level of posterior margin of coxae IV, with four pairs of setae, and a fifth pair set in cuticle very near posterior angle. Ventral cuticle with about 20 pairs of setae, including one much longer pair near posterior angle of anal shield, which is rather more elongate than in adult.

Legs and gnathosoma as in adult, but spinose setae on coxae I and III and gnathosomal setal pair rather weaker. Femora I with two incipient but distinct blunt tubercles dorsally.

Notes.—*Neolaelaps vitzthumi*, n. sp., is abundantly distinct from the other member of the genus, *N. spinosus* (Berlese). The two species may be separated by the armature of the gnathosoma, coxae I & III, femora I and anal shield; the structure and size of the stigmata; and the shape of the tritosternal laciniae.

Genus Peramelaelaps Womersley.

Peramelaelaps bandicoota Womersley, 1956.

This species was originally described from bandicoots from S.E. Queensland. The first extra-Australian record is 18♀♀, 30♂♂ and 2 nymphs from *Isoodon macrourus moresbyensis*, within five miles of Port Moresby, Papua, September, 1959, I. Cook.

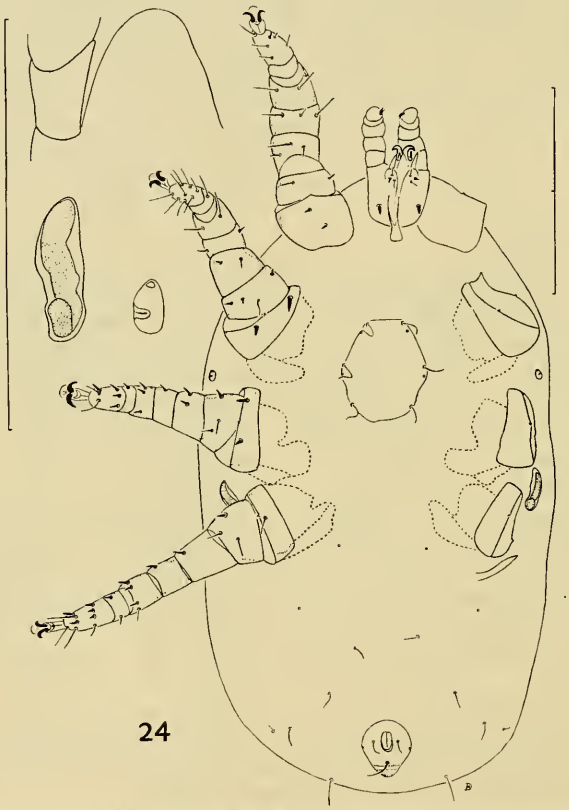
Genus Pneumonyssus Banks.

Pneumonyssus dentatus, n. sp. (Figs 24–26).

Types: Holotype nymph and one paratype nymph in Queensland Museum, Brisbane; also one paratype nymph each in Queensland Institute of Medical Research, Brisbane; British Museum (Natural History), London; and U.S. National Museum, Washington. D.C. The type series is in Hoyer's medium, and was collected in the nasal passages of a marsupial mouse, *Antechinus flavipes godmani* (Thomas) (Dasyuridae), trapped alive in rain-forest at 1,200′, Palmerston National Park, 20 miles west of Innisfail, north Queensland, 10.vi.1960, J. L. Harrison.

A further 85 nymphs in polyvinyl alcohol-lactophenol have been examined, but are not included in the type series. These are all from scale-tailed rats (Muridae) as follows: 71 from one *Melomys cervinipes* (Gould), secondary forest, Danbulla, Atherton Tableland, north Queensland, 13.viii.1958, J. L. H. and I. Cook; and 14 from two *M. cervinipes*, rain-forest at 1,200′, Palmerston National Park, 5–6.iii.1959, R.D. One of the latter two rats also had an intranasal species of *Walchia* (Trombiculidae) present.

Protonymph.—A large and sluggish species, creamy coloured, with short legs, and normally much distended. Length of idiosoma about 548–590μ in somewhat flattened specimens.



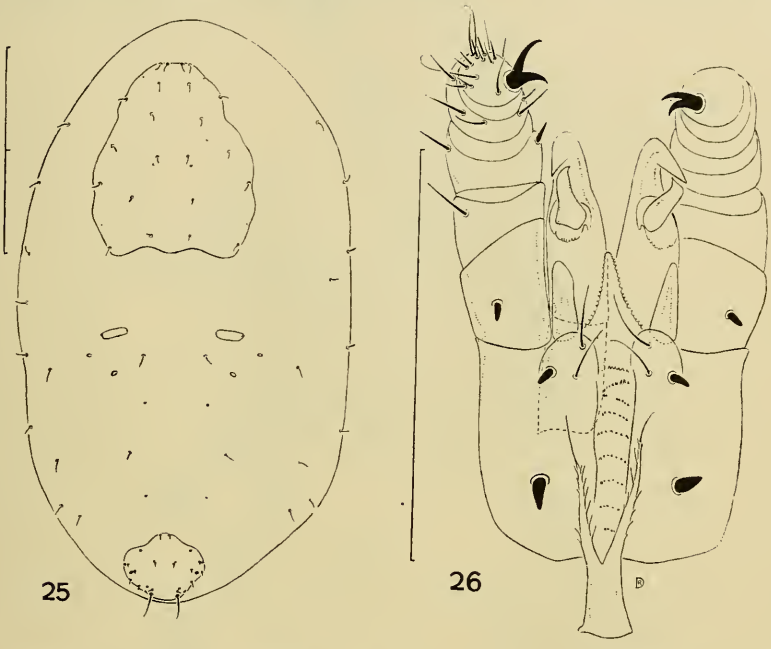
Text-fig. 24.—*Pneumonyssus dentatus*, n. sp. Protonymph. Venter, with insets showing tectum, peritreme, and plaque between coxae II and III.

Dorsum: Two weakly sclerotized dorsal shields present. Anterior shield larger, with irregular lateral margins, but evenly triconvex posterior margin; with 11 pairs of short setae and a few paired pores. Posterior shield strongly convex on all four sides, with seven (occasionally only six) pairs of minute setae, and one pair of much larger setae posteriorly. Small pores (one lateral pair especially distinct) are also present on the shield. Between the two shields are six platelets (the larger anterior pair having a pore in the exterior angles), two pairs of pores, and two transverse rows of four setae. Eight pairs of marginal setae are present.

Venter: Sternal shield subhexagonal, situated between coxae II and III; with three pairs of setae and two pairs of pores. Ventral cuticle behind coxae IV with four pores and ten setae. Anal plate rounded anteriorly, but with straighter posterior margins. Paired anal setae set near middle of anus, and weaker than postanal seta. Peritremes much abbreviated, lying above and between coxae III and IV. In a similar position between coxae II and III is a small sclerotized plaque.

Legs: Coxal setal formula 2.2.2.1, those on coxae I-III being spinose. Setae on legs III and IV also generally spinose. No longer setae dorsally on femora I & II. All tarsi with caruncle and two strong claws. All coxae except I with strongly sclerotized internal apodemes; coxae IV flanked posteriorly by sclerotized articulatory lunule.

Gnathosoma: Tritosternum well developed, but with laciniae not very long. Inner two pairs of hypostomal setae slender, but posterior pair and gnathosomal pair much thickened, and spine-like. Deutosternum with about nine irregularly arranged transverse rows of denticles. Labial cornicles quite well developed. Epipharynx as figured. Chelicerae stout, and extremely well sclerotized. Fixed digit with tip sharply recurved; without pilus dentilis. Movable digit sharply pointed distally, articulated in socket with



Text-figs. 25-26.—*Pneumonyssus dentatus*, n. sp. Protonymph. 25, Dorsum; 26, Gnathosoma.

several minute indications of a corona on ventral margin. Palpi stout, with spinose seta on trochanter, and large bifurcate tarsal claw. Tectum with very distinct, and strongly sclerotized, arched anterior edge.

Notes.—The adults of this remarkable species remain undetected, though the nasal passages of numerous animals have been examined (Domrow, 1961). The species is placed in the genus *Pneumonyssus* purely on ecological grounds.

Genus Raillietia Trouessart.

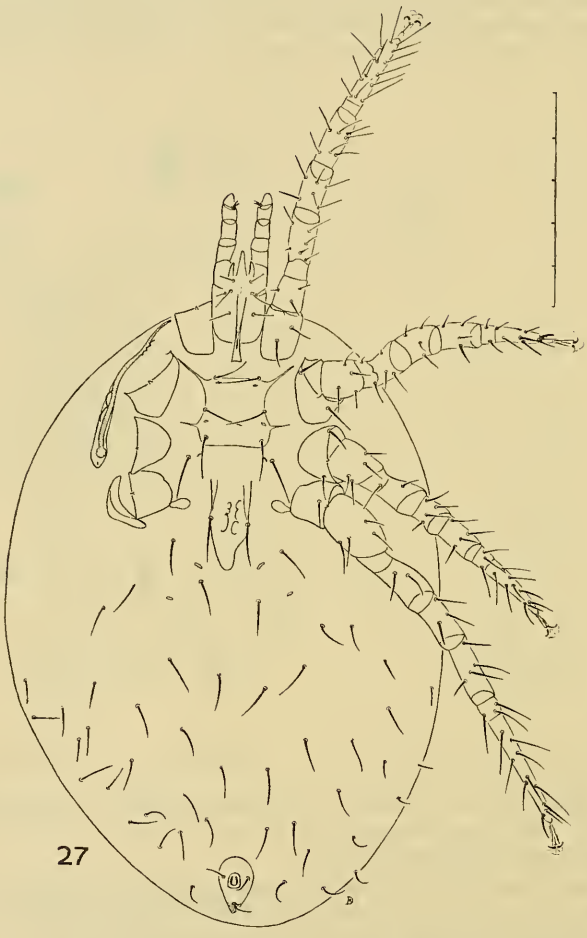
Raillietia australis, n. sp. (Figs 27–29).

Types: Holotype female in Division of Entomology, C.S.I.R.O., Canberra, and one paratype female in British Museum (Natural History), London. Both specimens are in Hoyer's medium, and were collected in the ears of a common wombat, *Phascolomis mitchelli* (Owen) (Vombatidae), Brindabella Road, A.C.T.-N.S.W. border, 24.v.1960, J. H. Calaby.

Female.—A large, creamy coloured, and weakly sclerotized species, greatly distended in appearance. Idiosomal length unavailable because of distortion.

Dorsum: Dorsal shield small, elongate-oval, and covering only the mid-portion of the anterior half of the dorsum. With 32 or 33 pairs of slender setae which increase in length posteriorly. In the specimen not illustrated, the two setae marked Y are

replaced on both sides by a single seta. In the same specimen, an additional short seta is present on one side at the location marked X. As the posterior pair of long marginal setae is preceded by a much shorter pair of setae on the shield proper, it seems that this represents the entire scutal complex. Nor has any postdorsal shield been noted. A regular pore-system is present, and the shield is further marked by a regular series of areolations indicating muscle insertions. The number of setae on the dorsal cuticle in the specimen illustrated is about 25 pairs; of these, the anterior pair is very small.



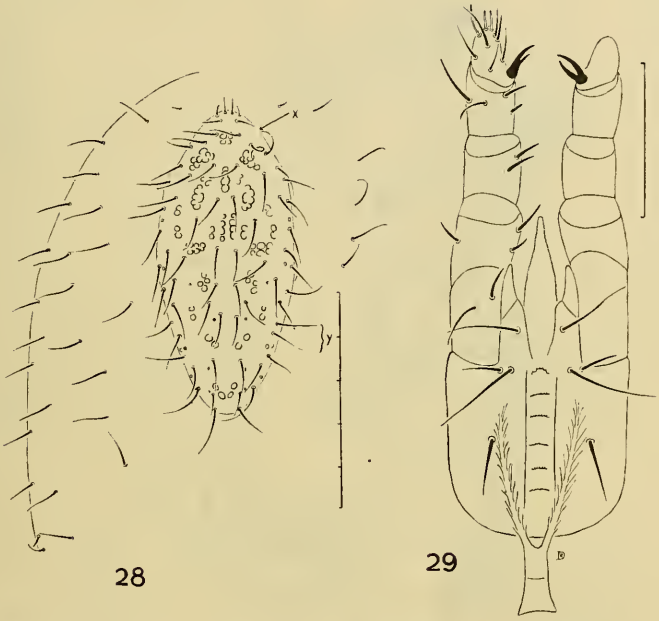
Text-fig. 27.—*Raillietia australis*, n. sp. Female. Venter.

Venter: Sternal shield reduced, and slightly longer than wide, with angles attenuated between coxae I & II and III & IV. With usual six setae and four pores. Metasternal setae and pores free in cuticle. With pair of internal sclerotizations between coxae IV. Genital plate reduced, irregular in outline, with two setae and areolations as on dorsal shield. Genital operculum indistinct. Anal plate arched anteriorly, and straight-sided posteriorly; with central anus and three subequal setae. Ventral cuticle with four platelets behind genital shield, and 23–25 pairs of setae. Peritremes reaching forward to level of coxae I, with crescentic markings as shown, and not extending posteriorly around coxae IV.

Legs: Coxal setal formula 2.2.2.1, all setae being slender and completely unmodified. All four pairs of legs slender, and with undistinguished setation. Femora I and II

without stronger setae dorsally. All tarsi with caruncle and two claws. An articulatory lunule flanks coxae IV posteriorly. Coxae II with small pointed process on antero-dorsal margin.

Gnathosoma: Tritosternum well developed, but with rather short laciniae. Hypostomal setae very slender, the anterior and inner posterior pairs being subequal, and about twice as long as the outer posterior pair. The gnathosomal pair are slightly thicker, and almost as long as the anterior hypostomals. Deutosternum with about six transverse rows of denticles. Labial cornicles present, but not very strong. Epipharynx slender, minutely spiculate, tapering distally. Chelicerae not clear, but well sclerotized, and with apically hooked and well-formed digits. Cheliceral teeth are, however, probably absent. Palpi slender, with bifurcate claw.



Text-figs 28-29.—*Raillietia australis*, n. sp. Female. 28, Dorsum; 29, Gnathosoma.

Notes.—This species has been assigned to the genus *Raillietia* partly on ecological grounds, but it does agree well with Strandtmann and Wharton's diagnosis (1958). An examination of male specimens should decide the matter. *R. australis* may be easily separated from the ear-mite of cattle, *R. auris* (Leidy), by the gnathosomal details, the relative sizes of the ventral shields, and the degree of setation of the body cuticle. A third species, *R. hopkinsi* Radford, has been described from an African waterbuck, but is apparently much closer to *auris* than to *australis*.

Genus Spinolaelaps Radford.

Spinolaelaps miniopteri (Zumpt and Patterson, 1952).

One female from a bat, *Miniopterus schreibersii blepotis*, Bonalbo Colliery, Bonalbo, N.S.W., 17.viii.1960, J. H. Calaby. The synonymy of this species is discussed by Till (1960); it occurs on bats both in South Africa and Australia.

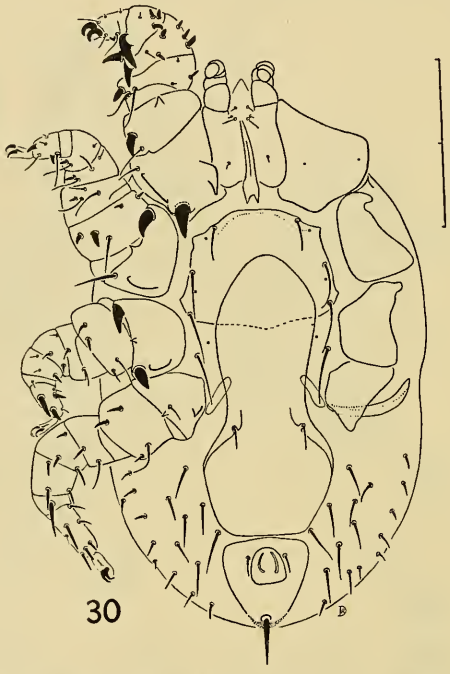
Genus Trichosurolaelaps Womersley.

Trichosurolaelaps crassipes Womersley, 1956.

In addition to two paratype females, I have lately been able to examine the two series from the collection of Dr. R. V. Southcott recorded by Womersley (1956). These comprise in all 20♀♀ and 7♂♂. I can now say that, in the male, the dorsal shield is longitudinally striate, the dorsal setae bladed, and the peritremes abbreviated, being

situated above coxae III. Nevertheless, the species may be recognized by the characteristic shapes of all ventral shields in both sexes, as well as by the attenuated peritremes peculiar to the female.

All these specimens are from the brush-tailed possum, *Trichosurus vulpecula* (Kerr) (Phalangeridae), as is a single deutonymph, Unley Park, South Australia, 28.vi.1954, ACC 680, R.V.S. by Berlese funnel. In this nymph, the dorsal shield is entire, with minute discal setae, and longitudinal striae. The peritremes are much abbreviated, not much longer than the diameter of the stigmata. Many body setae are bladed. Intercoxal shield with five pairs of setae, and terminating at level of posterior margin of coxae IV. Coxal armature as in adult, but slightly weaker.



Text-fig. 30.—*Trichosurolaelaps harrisoni,* n. sp. Female. Venter.

Trichosurolaelaps emanuelae Domrow, 1958*a*.

Apart from the original series from the New Guinea bandicoot, *Echymipera kalubu kalubu* (Lesson), I have since seen 18♀♀ and 6♂♂ from two bandicoots, Bengaragum Village, Maprik area, N.G., 28.i.1960, M. Willis and J. Wannan, and 1♀ from *Rattus exulans* (Peale), Korefeigu Village, Goroka area, N.G., 11.i.1960, M.W. and J.W. These specimens were examined through the courtesy of Dr. B. McMillan.

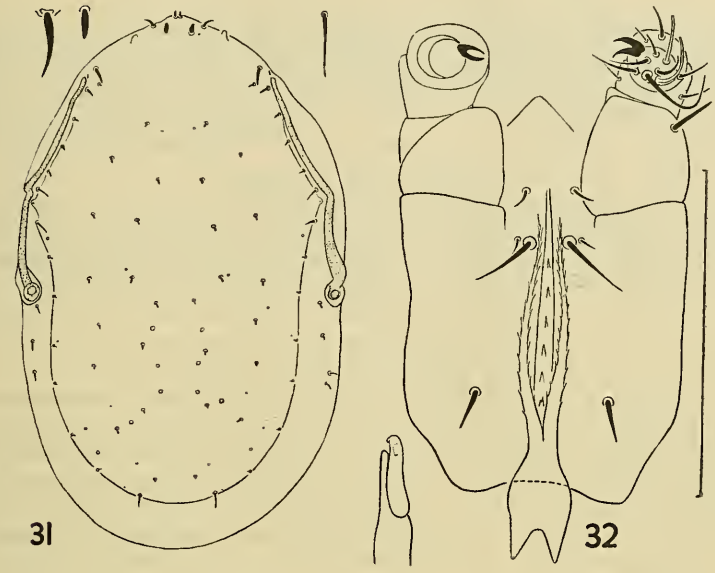
The females agree well with the original description, as do the males, but in the latter sex, the dorsal setae are variable. The disparity in length between the discal and marginal setae may be either more, or less, marked than illustrated.

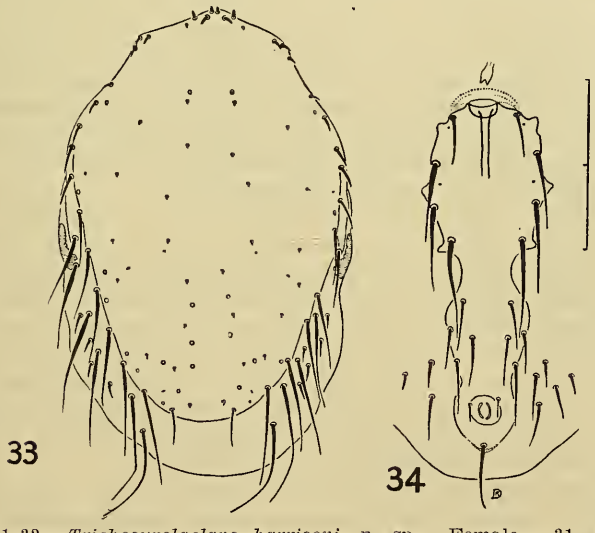
Trichosurolaelaps harrisoni, n. sp. (Figs 30–34).

Types: Holotype female and allotype male in Queensland Museum, Brisbane. in Hoyer's medium. Forty-five paratype females, and one paratype male in spirit have been divided between the Queensland Institute of Medical Research, Brisbane; Division of Entomology, C.S.I.R.O., Canberra; South Australian Museum, Adelaide; South African Institute for Medical Research, Johannesburg; U.S. National Museum, Washington, D.C.; and British Museum (Natural History), London. All these specimens, and five nymphs, were collected on two musk rat-kangaroos, *Hypsiprymnodon moschatus*

Ramsay (Macropodidae), trapped alive in rain-forest, Dinner Ck., near Innisfail, north Queensland, 30.vi.1960 and 4.viii.1960, J. L. Harrison.

A further three females in polyvinyl alcohol-lactophenol have been examined, but are not included in the type series. These are from the same host, trapped in rain-forest on hills (altitude less than 1,000′) immediately behind Etty Bay, near Innisfail, 6.viii.1958, J.L.H.





Text-figs 31-32.—*Trichosurolaelaps harrisoni*, n. sp. Female. 31, Dorsum, with insets of stronger setae from femur and trochanter I, and femur II (from left to right); 32, Gnathosoma (palpi deflexed), with inset of chelicera.

Text-figs 33-34.—*Trichosurolaelaps harrisoni*, n. sp. Male. 33, Dorsum; 34, Holoventral shield.

Female.—An oval, well sclerotized species with short thick legs. Length of idiosoma in mounted material about 605μ.

Dorsum: Dorsal shield covering most of dorsal surface, wider and slightly irregular in outline in anterior half, but evenly rounded posteriorly; with two small tubercles

near vertex. Vertical setae six in number, somewhat thickened. Lateral setae in 15 pairs, of which the anterolaterals and extreme posterior pair are strongest. Disc of shield with 14 pairs of setae. A regularly arranged series of pores is present. Texture of shield minutely granular. Dorsal body cuticle with a few pairs of simple setae. Peritremes with lateral stigmata, and dorsolateral peritremes, which reach forward to level of coxae I. Peritremalia not extending posteriorly around posterior margin of coxae IV.

Venter: Sternal plate subquadrate, with convex anterior margin, straight lateral margins, and medially convex posterior margin; with usual three pairs of setae and two pairs of punctate pores. Metasternal setae and pores free in cuticle. With two elongate-oval, internal sclerotizations between coxae IV. Genital plate also subquadrate, widest immediately behind coxae IV. With two anterolateral striae giving insertions of genital setae a pedunculate appearance as in *T. crassipes* Womersley. Genital operculum reaching forward to level of sternal setae II, evenly rounded, and with striate appearance. Anal plate triangular, with very slightly rounded sides. Anterior margin as wide as posterior margin of genital shield. Anus set in anterior half, and flanked by two adanal setae, which are much weaker than the postanal seta. Ventral cuticle with about 16 pairs of setae, which decrease in length marginally.

Legs: Coxal setal formula 2.2.2.1, the posterior seta on coxae I, the anterior seta on coxae II, and both setae on coxae III being greatly thickened and spine-like. In addition, coxae I and IV have a pointed, backwardly-directed process near their inner margins, while coxae I, II and III have a distinct sclerotized ridge along their posterior margins. With lunate articulatory sclerotization behind coxae IV. Coxae II with pointed process on anterodorsal margin. Most leg segments with strong spinose setae, some especially so, e.g., trochanter and telofemur I. Tarsus I with one, and tarsus II with two small pointed processes; tibia and genu I with strong retrorse spinose process on posterior margin. Femur and trochanter I each with a stronger seta dorsally; femora II with a longer seta dorsally. All tarsi with caruncle and two claws, those of tarsi I being the strongest.

Gnathosoma: Tritosternal base strongly sclerotized, and bipartite posteriorly; merging into two ciliated laciniae, which extend forward to level of hypostomal setae. Inner posterior pair of hypostomal setae the strongest. Gnathosomal setae intermediate in size. Deutosternum with about six denticles in single file. Chelicerae quite slender, fixed digit not dentate, but movable finger weakly hooked apically, and with weak tooth on margin. No fringe of setulae was seen surrounding the insertion of the movable finger. Palpi undistinguished; tarsus with bifurcate claw.

Male.—Slightly smaller, and less rounded than the female. Length of idiosoma in mounted material 506μ.

Dorsum: Dorsal shield wider in anterior half, with eight vertical setae and 15 pairs of lateral setae, which steadily increase in length posteriorly, except the extreme posterior pair which are scarcely half as long as the subposterior pair. Disc with 13 or 14 pairs of minute setae, the pattern, as well as that of the pores, being slightly irregular posteriorly. Dorsal marginal cuticle with several elongate setae interspersed with short spinules. All the longer dorsal setae are bladed basally as in *T. striatus* Domrow. Likewise, the dorsal shield is finely longitudinally striate as in that species. Peritremes much abbreviated, situated above coxae III and IV.

Venter: All ventral plates fused to form holoventral plate. Genital aperture in convex anterior sternal margin. All ventral setae subequal, except sternal setae II and III and the metasternals, which are much stronger than the others. Sternal and metasternal pores as in female. Ventral area scarcely broader than anal area, with three pairs of usurped ventral setae. Anal area much as in female. Ventral cuticle with three to five pairs of setae.

Legs and gnathosoma essentially as in female. Chelicerae not clearly visible, but not grossly modified.

Notes.—The insertions of the genital setae of *T. quadratus*, n. sp., show some resemblance to those of *T. crassipes* Womersley, the genotype, but in other characters,

e.g., the peritremes, it is more closely related to *T. striatus* Domrow. It may be separated from this species in the female by the armature of the coxae, the shape of the genital shield, and the relative lengths of the posterior pair of setae on the dorsal shield. In the male, the two species may be separated by the coxal armature, the shape of the holoventral shield, and the relative lengths of the sternal, metasternal, and the posterior pair of setae on the dorsal shield.

Trichosurolaelaps striatus Domrow, 1958*a*.

This species was originally described from the ring-tailed possum, *Pseudocheirus peregrinus laniginosus* (Gould), from Queensland. The following additional material has since been examined: 13♀♀, 2♂♂, *P. convolutor* (Oken), Glenora, Tasmania, 2.vi.1960, B. C. Mollison. There is a further series from a Tasmanian ring-tail in the South Australian Museum, Adelaide.

Family TROMBICULIDAE.

Five species with expanded sensillae have already been described from Innisfail, in the genera *Guntherana* and *Ascoschöngastia* (Domrow, 1960*b*, 1960*c*). An intranasal species of *Walchia* is being described by Col. R. Traub (in ms), while the remaining new species (with filamentous sensillae) is described below.

Genus Trombicula Berlese.

Trombicula alicola, n. sp. (Figs 35–39).

Types: Holotype larva and one damaged paratype larva in Queensland Museum, Brisbane, in polyvinyl alcohol-lactophenol. Both specimens were collected on the hind margin of the wings of leaf-nosed bats, *Rhinolophus megaphyllus* Gray (Rhinolophidae), in a cave, Bramston Beach, north Queensland, 27.vii.1959, J. L. Harrison coll.

Larva.—A small, weakly sclerotized species, idiosoma barely exceeding 400μ in mounted, engorged specimens. Body cuticle annulate.

Body setation: Dorsal setae cylindrical and barbed, arranged 2.8.6.6.6.4. Humeral setae 34, middorsal setae 27, caudal setae 23μ long. Ventral setae irregularly arranged, about 50 in number, those adjacent to anus being 17μ long. Coxal setae 1.1.1; sternal setae 2.2.

Gnathosoma: Cheliceral bases very stout, but cheliceral blades missing in both specimens. Galeal setae fine and nude. Palpal coxal setae long, with about five slender ciliations. In addition to the usual ventroexternal tarsala, the palpal formula is b. b. bbb. B+4b. Subterminala absent. Palpal claw with three prongs.

Scutum almost square, but slightly wider than long. Lateral margins parallel; anterior margin ever so slightly concave, but a little convex around insertion of AM; posterior margin shallowly convex. AL not set on shoulders, and slightly in front of AM; PL set in extreme posterolateral angles. PL and AM subequal, and longer than AL. SB much closer to level of PL than that of AL. Sensillae filamentous, short, branched except on basal third. Punctae present. The scutal standard data are given below. Eyes double, diameter of anterior lens 14μ.

Legs all seven-segmented. All tarsi with basal bar, and caruncle and two claws. The specialized setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala 19μ long, and microtarsala. *Tibia I* with two tibialae and microtibiala. *Genu I* with three genualae and microgenuala. *Tarsus II* with pretarsala, tarsala 16μ long, and microtarsala. *Tibia II* with two tibialae. *Genu II* with genuala. *Tibia III* with one mastiseta. *Genu III* with two mastisetae.

Standard data in micra of larval scutum of T. alicola.

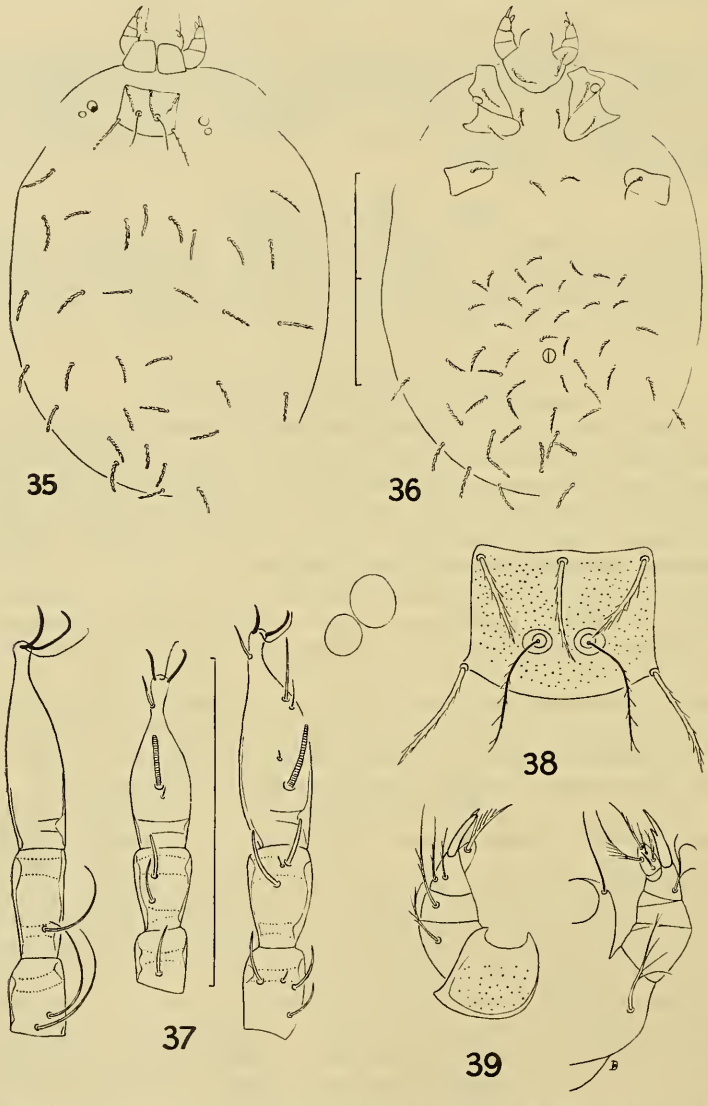
AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens
49	58	15	29	17	46	34	34	27	36	39

Notes.—*T. alicola*, n. sp., appears closely related to *T. insolli* Philip and Traub, 1950, described from a Malayan bat, *Eonycteris spelaea*. The two species may be separated by the setation of the palpi, dorsum, and legs III.

Genus Neotrombicula Hirst.

Neotrombicula comata, n. sp. (Figs 40–44).

Types: Holotype larva in Division of Entomology, C.S.I.R.O., Canberra, and one paratype larva each in British Museum (Natural History), London, and U.S. National Museum, Washington. All three specimens are in polyvinyl alcohol-lactophenol, and



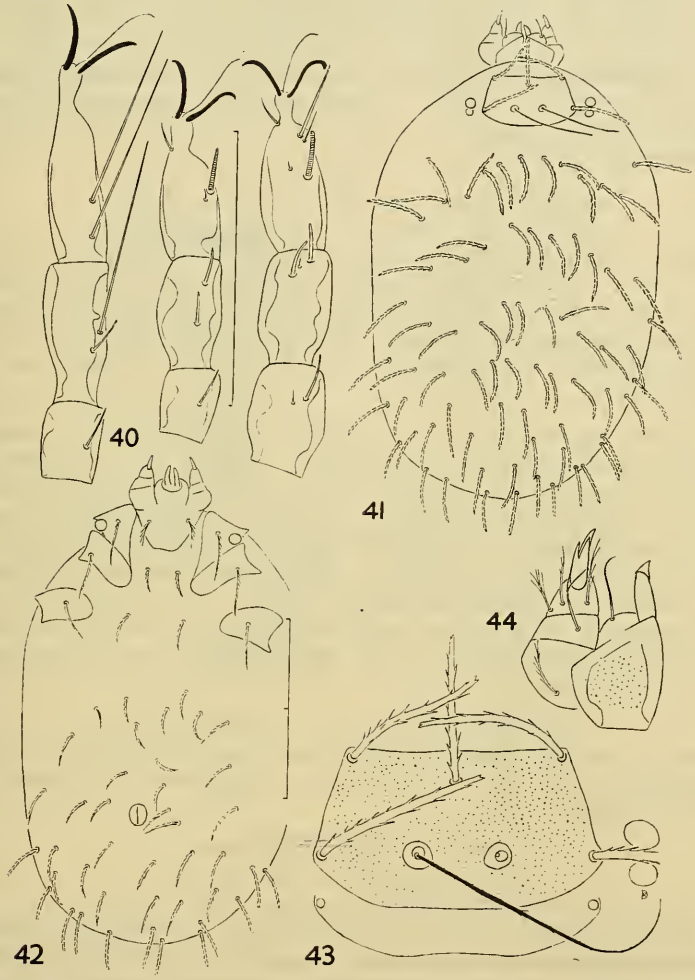
Text-figs 35-39.—*Trombicula alicola*, n. sp. Larva. 35, Dorsum; 36, Venter; 37, Specialized setation of legs I-III (right to left); 38, Scutum and eyes; 39. Dorsal and ventral views of gnathosoma (left to right).

were collected from among a mass of chiggers "attached in a concentric area about one inch in diameter around the base of the scrotal stalk" of a short-nosed bandicoot, *Isoodon macrourus* (Gould) (Peramelidae), Tooloom, N.S.W., 19.viii.1960, J. H. Calaby.

Associated chiggers were *Trombicula mackayensis* Womersley, 1954*a* (in large numbers), and occasional specimens of *Neotrombicula thylogale* (Womersley, 1954*a*) and *Guntherana* (*Derrickiella*) *perameles* (Womersley, 1939).

Larva: A medium sized, and well sclerotized chigger, with idiosoma 440–506μ long in mounted, engorged specimens. Body cuticle annulate.

Body setation: Dorsal setae cylindrical and barbed, arranged 2.10–12.10.12.10–12+24. Humeral setae 65–70, middorsal setae 49–52, caudal setae 47–50μ long. Ventral setae irregularly arranged, about 40 in number, those near anus being 36–40μ long. Coxal setae 1.1.1; sternal setae 2.2.



Text-figs 40-44.—*Neotrombicula comata*, n. sp. Larva. 40, Specialized setation of legs I-III (right to left); 41, Dorsum; 42, Venter; 43, Scutum and eyes; 44, Dorsal view of gnathosoma.

Scutum transversely rectangular. Anterior and lateral margins almost straight. Posterior margin shallowly convex, but very weakly concave medially in one specimen. AL not on shoulders, and well in front of level of AM. AM and AL subequal, but shorter than PL. SB in line with PL. Sensillae filamentous, finely barbed. Punctae present. The scutal standard data are given below. Eyes double, diameter of anterior lens 13–14μ.

Legs all seven-segmented. The specialized setation is as follows: *Tarsus I* with pretarsala, subterminala, parasubterminala, tarsala 17μ long, and microtarsala. *Tibia I* with two tibialae and microtibiala. *Genu I* with genuala and microgenuala. *Tarsus II*

with pretarsala, tarsala 16μ long, and microtarsala. *Tibia II* with two tibialae. *Genu II* with genuala. *Tarsus III* with two mastitarsalae. *Tibia III* with tibiala and mastitibiala. *Genu III* with genuala.

Standard data in micra of larval scutum of N. comata.

AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens
74	97	28	36	18	54	37	52	54	60	107
76	98	30	38	19	57	38	54	57	65	—
79	100	31	39	20	59	38	58	55	66	—

Notes.—Neotrombicula comata, n. sp., is a member of the *novaehollandiae* complex as discussed by Womersley (1954*a*). It may be easily distinguished from the four species already included (*thylogale, derricki, antechinus*, and *novaehollandiae*) by its extremely heavy body setation.

Genus Guntherana Womersley and Heaslip.

Guntherana andromeda (Womersley, 1954*a*).

This species was originally described from free-living larvae collected in S.E. Queensland. I have since seen the following material from the ears of two species of wallabies: two larvae from *Thylogale thetis*, Mt. Tamborine, 10.v.1960; twelve larvae from *Protemnodon dorsalis*, Mt. Lindesay, 24.iv.1960, all collected by J. H. Calaby and party. Associated species (except for several *G. cassiope* and *Acomatacarus* sp. larvae) are discussed below.

Guntherana philippensis (Philip and Woodward, 1946), n. comb.

This species was originally described from *Rattus* spp. in the Philippines, and Womersley (1952) recorded specimens collected from *Onychogalea* in the Northern Territory. These latter specimens are not in good condition, and I was unwilling (1960*b*) to accept this species as Australian. However, the recent recovery of 46 larvae in the ears of another macropodid host (*P. dorsalis*, Mt. Lindesay, 24.iv.1960) confirms Womersley's record. *G. philippensis* has six setae in the first dorsal row, and may be immediately separated from its two near relatives (*G. andromeda* and *G. parva*) by its characteristically shaped scutum. The anterolateral scutal excavations are also present in *G. antipodiana*.

Guntherana kallipygos (Gunther, 1939).

A variety of rats and bandicoots have been recorded as hosts for this species, but the following is the first record from a macropodid—two larvae, *T. thetis*, Mt. Lindesay, 24.iv.1960.

Family LISTROPHORIDAE.

Genus Austrochirus Womersley.

Austrochirus mcmillani, n. sp. (Figs 45, 62).

Types: Holotype male in School of Public Health and Tropical Medicine, Sydney, and one paratype male in British Museum (Natural History), London. Both specimens are in Hoyer's medium, and were collected on a marsupial bandicoot (Peramelidae), Bengaragum Village, Maprik area, New Guinea, 28.i.1960, M. Willis and J. Wannan.

Male.—A strongly sclerotized species, with body (including capitulum) approximately 528μ long.

Dorsum: Postcapitular shield simple, broader in posterior third, with uniform punctae in an arch-like pattern; flanked by four setae, of which the posterior two are the stronger. Middorsum with several transverse annulations medially, and scaly laterally. Posterior portion covered by weakly scaled cuticle, with four short setae in transverse row anteriorly, and two weak and four long flagelliform setae posteriorly. Posterolateral zones weakly sclerotized.

Venter: Genitalia preceded by four minute discs. Intromittent organ short, and flanked posterolaterally by two crescentic sclerotized supports, each of which bears a single seta. Anus subterminal, elongate, and flanked by two minute suckers and

setae, all of which are surrounded by a sclerotized frame. A further pair of setae are set between the genitalia and the anus. Caudal lobe transparent marginally, with four weakly defined lobules, and four pairs of flagelliform setae.

Legs: Legs I and II typical of genus. Usual two pairs of striate clasping zones present, with a pair of setae between them. Apodemes III arched and strongly sclerotized, preceded by usual three pairs of setae, one pair of which is flagelliform. Legs III greatly enlarged. Basal movable segment with single seta. Mid two segments almost completely fused, but with division noticeable on inner aspect; with seta in dorsodistal angle. Tarsus III with six simple setae arranged as figured, together with very strong seta dorsobasally. With four setae between apodemes III and IV.

Text-fig. 45.—*Austrochirus mcmillani*, n. sp. Male.

Apodemes IV also strongly arched, with T-shaped extension running forward, so that the arms of the T appear to fuse with the posterior edge of apodemes III. A further inverted V-shaped sclerotization, the arms of which are expanded distally and provided with a seta, is also associated with apodemes IV. Legs IV also enlarged, slightly more so than legs III. Three basal movable segments as in legs III, but without setae. Tarsi IV with about five short setae as shown, and stronger seta dorsobasally. Tarsi III and IV with blunt, subapical processes, and well developed pulvilli.

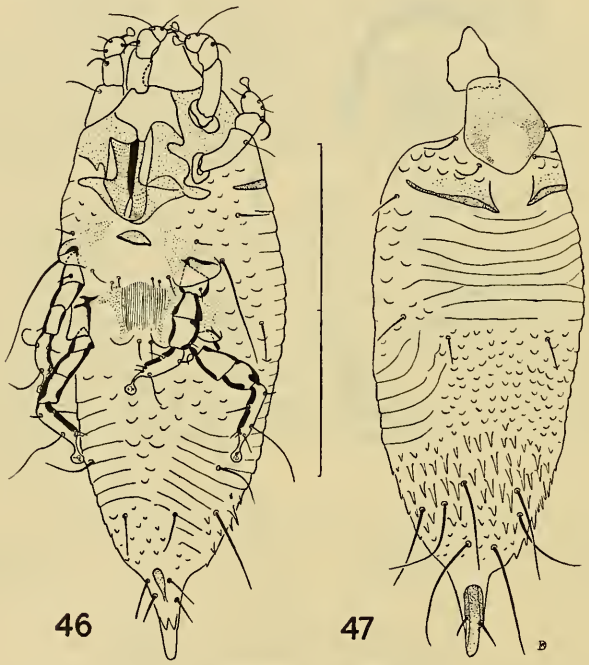
Notes.—Austrochirus mcmillani, n. sp., is a member of the *queenslandicus* species group as defined by Domrow (1960*a*), and is also from a peramelid host. Its postcapitular shield, and the structure of the posterior legs, genitalia, and caudal lobe will separate it easily from the other two known members of this group—*A. queenslandicus* Womersley, 1943 (Fig. 61) from short- and long-nosed bandicoots (*Isoodon macrourus* and *Perameles nasuta*), and A. *filmeri* Domrow, 1960*a*, from the bilby (*Macrotis lagotis*).

The specific identity of the host of *A. mcmillani* is unknown, but it was associated with *Trichosurolaelaps emanuelae* Domrow, 1958*a*, whose type host is *Echymipera kalubu kalubu* (Lesson).

Austrochirus trouessarti, n. sp. (Figs 46–48).

Types: Holotype female and allotype male in Queensland Museum, Brisbane; one paratype male each in South Australian Museum, Adelaide; British Museum (Natural History), London; U.S. National Museum, Washington, D.C. All five specimens are in polyvinyl alcohol-lactophenol, and were collected from marsupial mice, *Antechinus flavipes godmani* (Thomas) (Dasyuridae), rain-forest at 1,200 feet, Crawford's Lookout, Palmerston National Park, north Queensland, 18.iii.1959 and 10.vi.1960, J. L. Harrison and R.D.

Female.—A small, almost white, and delicately sclerotized mite with body 380μ long from tip of gnathosoma to end of caudal process.



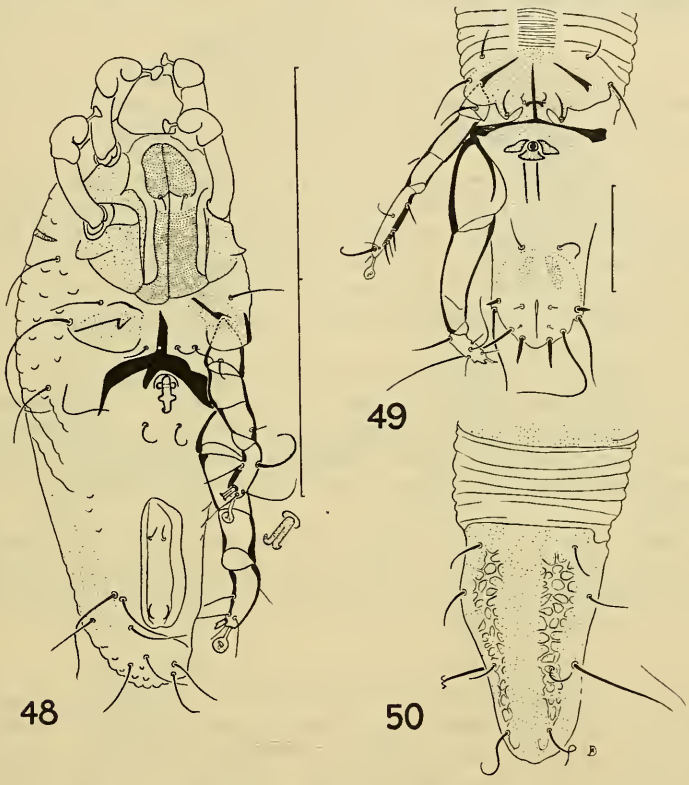
Text-figs 46-47.—*Austrochirus trouessarti*, n. sp. Female. 46, Venter; 47, Dorsum.

Dorsum: Postcapitular shield flanked posteriorly by two pairs of subequal setae; anterior half evenly and weakly punctate, but posterolateral fields each with a tapering strip of heavy punctae. Accessory lobes present, strongly sclerotized along their posterior margins, and marked anteriorly with crescentic striae. Body cuticle divided rather sharply into three distinct zones of differing texture—transverse striae, crescentic striae, and elongate papillae; with four shorter setae between the first two zones, and eight rather larger setae arranged 6.2 across the third. Apex of opisthosoma produced into a slender, dorsally sclerotized process bearing two stiff setae.

Venter: Cuticle mainly marked with crescentic striae, but transversely striate posterolaterally. Genitalia preceded by two short, and four minute setae; with zone of fine longitudinal striae between two backwardly-directed bands of sclerotized cuticle, each of which is followed by a lobule and a short seta. Anus subterminal, near base of caudal process; flanked by four subequal setae, and preceded by two pairs of slightly longer setae, the anterior pair of which is more widely set than the posterior.

Legs: Legs I and II typically atopomeline, slightly flattened, and with strongly recurved seta dorsally. Caruncles present. Clasping apparatus also typical, although the anterior zone of striae, and the pair of setae behind it, are not visible. Coxae III separated by transverse suboval sclerotized bar; anterior margins preceded by an inner minute seta, and an outer very long seta, above which is a third seta. Legs III and IV each with four movable segments. Basal and penultimate segment of leg III each with single seta. Tarsi with setation typical of genus.

Male.—Rather smaller, but slightly more heavily sclerotized than female. Length of body including capitulum 283–312μ.



Text-fig. 48.—*Austrochirus trouessarti*, n. sp. Male. Venter.
Text-figs 49-50.—*Cytostethum mollisoni*, n. sp. Male. 49, Venter; 50, Dorsum.

Dorsum: Anterior half exactly as in female; posterior half without terminal process, and covered by small papillae of uniform size.

Venter: Anterior half as in female. Genitalia set immediately behind apodemes of leg IV. Intromittent organ as figured, recurved distally, with hook directed inwardly. Two simple setae behind genitalia. Anal plaque elongate, with two small setae anteriorly, and possibly with two discs posteriorly. Opisthosoma slightly sclerotized posterolaterally, with four pairs of stronger setae; papillate terminally, with two pairs of weaker setae.

Legs: Legs III as in female, but slightly stronger, and with strong bifid seta with diverging prongs near apex of tarsus. Legs IV rather stronger still, with distinct subapical process near caruncle.

Notes.—*A. trouessarti*, n. sp., is the second known member of the *sminthopsis* species group as defined by Domrow (1960*a*). Both species are from phascogalines,

and are characterized by the possession of papillate cuticle and accessory lateral lobes to the postcapitular shield. The new species may be recognized by three characters—the three types of dorsal cuticular texture, the long posterodorsal setae, and the peculiar caudal process. None of these characters is present in *A. sminthopsis* Womersley, 1954*b*, also collected on a marsupial-mouse, *Sminthopsis crassicaudata* (Gould), but in arid country in south-east South Australia.

This species is named for the late Dr. E. L. Trouessart, who named (1893) the first Australian atopomeline, *Campylochirus chelopus* Tr., a parasite of the Tasmanian ring-tailed possum, *Pseudocheirus convolutor* (Oken). Fifty years were to pass before a second species was described (Womersley, 1943), and sixty-three before *C. chelopus* was seen again (Domrow, 1956*b*).

Genus Cytostethum Domrow.

Cytostethum promeces Domrow, 1956*a*.

One male, *Potorous tridactylus*, Maydena, Tas., 27.vi.1960, B. C. Mollison. This is the type host, but the previous records are from Queensland.

Cytostethum pseudocharactum Domrow, 1956*a* (Fig. 60).

Types: Allotype male and two paratype males in Queensland Museum, Brisbane, from the type host, *Potorous tridactylus*, Maydena, Tas., 27.vi.1960, B. C. Mollison. Eight females were also taken. In Hoyer's medium.

Male.—A well sclerotized, stout-bodied species, with length of idiosoma (including gnathosoma) about 642μ in mounted material. Dorsally and anteriorly essentially as in female.

Venter: Genitalia set between basal movable segments of legs IV; intromittent organ short, preceded by four small discs and two setae. Anus longitudinal, flanked by three pairs of small discs, and preceded by two setae, and two transverse sclerotized rods. Posterior body lobe a narrow, transparent marginal strip, preceded by the heavily sclerotized body margin, which bears five pairs of setae, two pairs of which are flagelliform.

Legs: Legs III as in female. Apodemes IV united medially with longitudinal strut, and preceded by four small setae. Legs IV much enlarged, and heavily sclerotized. Central two movable segments only weakly divided ventrally. Tarsi IV strong, with six setae and much reduced caruncle.

Cytostethum mollisoni, n. sp. (Figs 49–52).

Types: Holotype female, allotype male, and two pairs of paratypes in Division of Entomology, C.S.I.R.O., Canberra; one pair of paratypes each in British Museum (Natural History), London, and U.S. National Museum, Washington, in Hoyer's medium. All these, together with very numerous other specimens in spirit, were collected on a rat-kangaroo, *Potorous tridactylus* (Kerr) (Macropodidae), Maydena, Tasmania, 27.vi.1960, B. C. Mollison.

Female.—A slender, but well sclerotized species, with body (including gnathosoma and terminal process) 660–682μ.

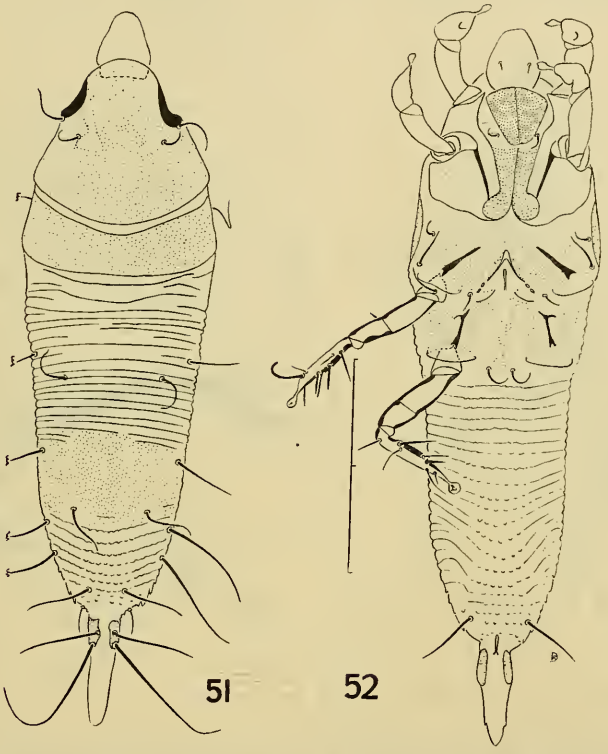
Dorsum: Anterodorsal shield slightly longer than wide, with texture as figured, and four setae. Middorsal shield concave anteriorly to accept convex posterior margin of preceding shield; with a seta in each anterior angle. Middorsum with band of about 16 simple annulations bearing transverse row of four setae. Postdorsal shield wider than long, poorly defined, with four setae; followed by about seven minutely dentate annulations, and eight setate. End of body produced into distinct terminal process, which is sclerotized basolaterally, and bears four setae.

Venter: Genitalia set between coxae III, followed posteriorly by four minute discs, a pair of setae, and two sclerotized longitudinal strips, the apices of which bear a further pair of setae. Two specimens carry a single elongate ovum in the opisthosoma, 214×53 and $224 \times 58\mu$ long. Cuticle with about 20 minutely dentate annulations and two posterior setae. Anus longitudinal, and set just behind these two setae.

Legs: Legs I and II and clasping organ typical of subfamily. Leg III with seta on basal and penultimate movable segment. Tarsi III and IV with eight and seven setae respectively, as figured for other species from *Potorous* (Domrow, 1956*a*).

Male.—Also a slender form, but smaller than female. Length of body including gnathosoma 511–539μ. Terminal process absent. Anterior half of body as in female. Middorsal shield followed by only six annulations. Postdorsal shield covering end of body completely, areolate laterally, with eight shorter and two longer setae.

Venter: Genitalia set between legs IV. Intromittent organ short, flanked anteriorly by two sclerotized bars, and followed by two elongate sclerotized strips. Posterior body lobe marked off by semicircular line preceded by two setae; with two sclerotized plaques, four minute setae and anus discally, and four flagelliform and four spine-like setae marginally.



Text-figs 51-52.—*Cytostethum mollisoni*, n. sp. Female. 51, Dorsum; 52, Venter.

Legs: Legs III as in female. Legs IV thickened, and with central two movable segments weakly divided ventrally. Tarsus IV with five setae, two sub-terminal processes, and much reduced caruncle.

Notes.—*C. mollisoni*, n. sp., is the sixth characteristic form of *Cytostethum* to be described from *Potorous tridactylus*. At least three (and probably five) forms have been found on the one individual host, so it seems unlikely that they are simply seasonal or ecological variants within a single species.

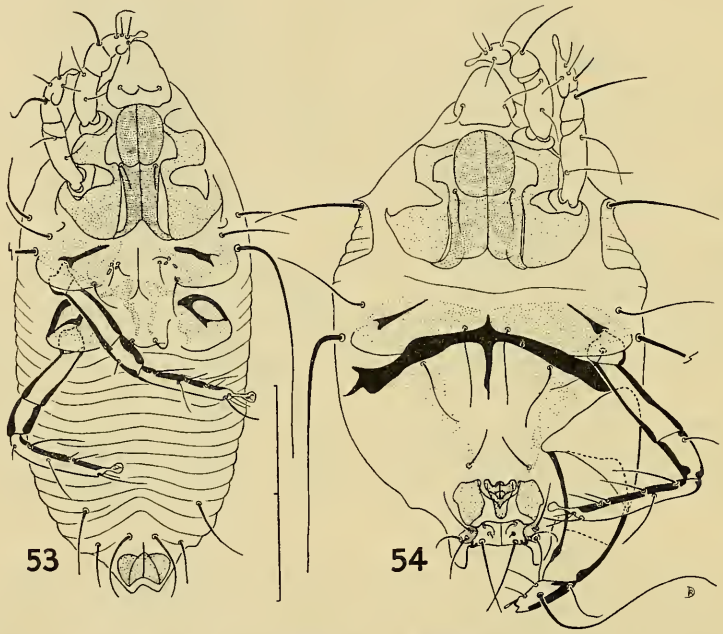
The males of five of these forms are known, and in each the genitalia, caudal lobe, and modified (clasping) legs IV are quite different. All six female forms are likewise immediately recognizable morphologically, and ova have been seen in four. Thus, although the six forms are sympatric, they are morphologically quite distinct, and apparently reproductively isolated. The recognition of all six forms as full species therefore seems justified.

Cytostethum clibanarius, n. sp. (Figs 53–56).

Types: Holotype female, allotype male, and one pair of paratypes in Queensland Museum, Brisbane. These specimens are in polyvinyl alcohol-lactophenol, and were collected on a rat-kangaroo, *Aepyprymnus rufescens* (Gray) (Macropodidae), found dead on the road near Herberton, north Queensland, 9.iv.1959, R.D.

Female.—A large, cream coloured, and fairly well sclerotized mite, 518–565μ long from tip of gnathosoma to end of opisthosoma.

Dorsum: Postcapitular shield partly covering gnathosoma, subcircular, finely punctate except for a strip across anterior margin; flanked posteriorly by four subequal setae. Behind these structures is a second, transverse shield, which is finely punctate and without setae. About ten transverse cuticular annulations follow on the middorsum. The annulations in the posterior third are interrupted by two weakly separated median shields; the more anterior is weakly sclerotized and with a seta in each



Text-figs 53-54.—*Cytostethum clibanarius*, n. sp. 53, Venter of female; 54, Venter of male.

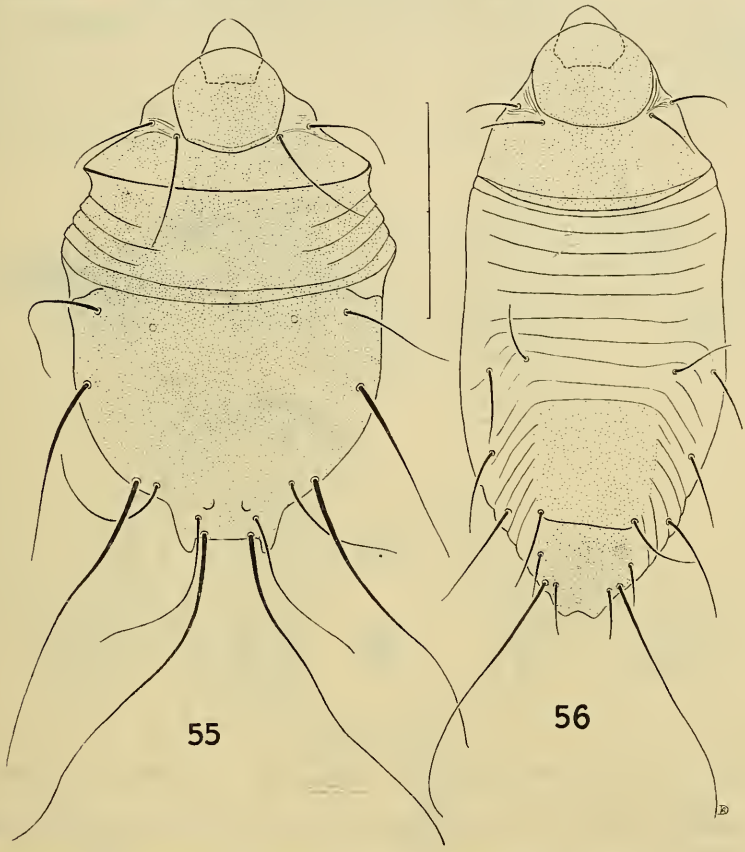
posterolateral corner, while the posterior is strongly sclerotized, and bears three pairs of setae, the central pair being exceedingly long. Four further pairs of setae, which increase in length posteriorly, are set in the lateral annulations on either side of these posterior shields.

Venter: Gnathosoma, legs I and II, and clasping apparatus between coxae I and II typically atopomeline. Genitalia between coxae III, with two pairs of minute suckers and setae. A third pair of setae is situated nearby on the inner posterior angles of coxae III. Genitalia followed by two backwardly-directed punctate strips, which terminate near a pair of setae between coxae IV. Anus subterminal, between two slight caudal lobes; preceded by six setae arranged 2.4. Ventral cuticle with about fourteen transverse annulations behind legs IV.

Legs: With a smaller, and a very much larger seta above coxae III, and a further seta above these (in life, the large seta is stretched out at right angles to the body, but has been depicted as adpressed to save space). Posterior margins of coxae III and IV flap-like, covering part of basal movable segments of legs III and IV. Penultimate segment of legs III with a single seta, but basal movable segment

apparently without one. Tarsi III and IV with eight and seven setae respectively, arranged as in the other species of the genus (Domrow, 1956*a*).

Male.—A very dark brown, heavily sclerotized, and squat mite, with body 460–492μ long from tip of gnathosoma to end of caudal processes. Postcapitular shield as in female, but flanked by setae which are about twice as long. Second dorsal shield wider, but not as deep as in female. Middorsum covered by extremely heavily sclerotized cuticle, which has about four annulations laterally. This band of cuticle



Text-figs 55-56.—*Cytostethum clibanarius*, n. sp. 55, Dorsum of male; 56, Dorsum of female.

is of the same appearance as the dorsal shields. Posterior half of idiosoma covered entirely by postdorsal shield, with two blunt caudal processes posteriorly, and six pairs of setae laterally. Of these setae, the pair between the caudal processes, and the third pair in front of them, are extremely long.

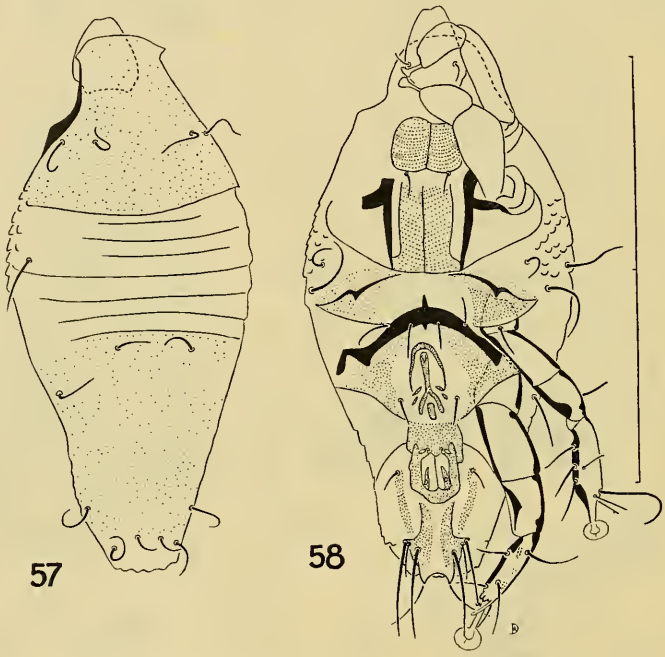
Venter: Anterior half of body as in female. The dorsal band of heavily-sclerotized, annulate cuticle encroaches slightly onto the ventral surface at the level of the posterior half of the clasping apparatus; a strong seta is set in each anterior angle. Genitalia near posterior end of body, with short intromittent organ guided between two lateral sclerotizations. Anus subterminal, flanked on each side by three pairs of setae, and a tubercle bearing a further three setae.

Legs: Legs III as in female, but with a seta on basal movable segment. Coxal apodemes IV very heavy, and united medially with a longitudinal strut. Two sclerotized strips run back to terminate near a seta as in female. Legs IV very stout, with

second and third movable segments fused ventrally, and only weakly divided dorsally. Tarsus IV with minute unexpanded caruncle and four setae, of which the ventrolateral is extremely long as in *C. promeces* Domrow.

CYTOSTETHUM PARVUM, n. sp. (Figs 57–58).

Types: Holotype male and one paratype male in Queensland Museum, Brisbane; one paratype male in British Museum (Natural History), London, and two paratype males in U.S. National Museum, Washington. All specimens are in Hoyer's medium, and were collected on a musk rat-kangaroo, *Hypsiprymnodon moschatus* Ramsay (Macropodidae), rain-forest, Dinner Creek, near Innisfail, north Queensland, 30.vi.1960, J. L. Harrison.



Text-figs 57-58.—*Cytostethum parvum*, n. sp. Male. 57, Dorsum; 58, Venter.

Male.—A very small, but well sclerotized species, with body (including capitulum) 258–268μ long.

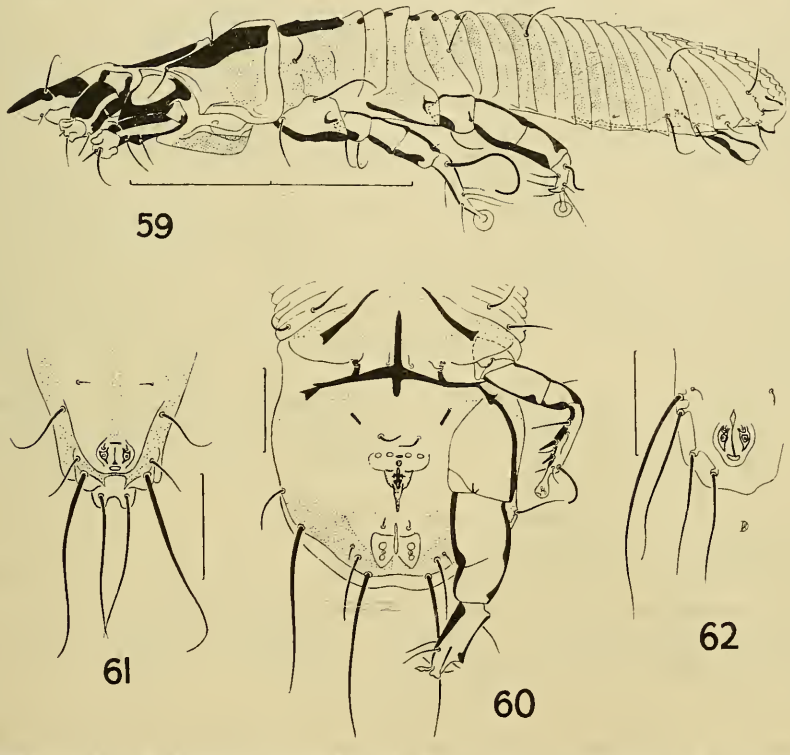
Dorsum: Postcapitular shield completely merged into a second, more posterior sclerotization, so that the four postcapitular setae are set in a transverse line across the combined shield. Middorsum with about seven transverse annulations. Posterior half of dorsum covered with weakly sclerotized cuticle, with four setae anteriorly, and six setae arranged 2.4 posteriorly. Extreme posterior margin weakly scalloped.

Venter: Legs I and II, and clasping organ typical of genus. Genitalia between legs IV. Intromittent organ in shape of inverted Y, with apex recurved; preceded anteriorly by sclerotized arch, and posteriorly by several short sclerotized rods and two setae. Anus elongate, surrounded by particularly heavily sclerotized framework, which bears two minute setae anteriorly. This structure is flanked posterolaterally by two elongate sclerotizations, which bear a seta anteriorly. Still further back, and more medially, are a further two longitudinal sclerotizations, into which are inserted three pairs of setae, the apices of which merge into two small, pointed, and projecting terminal processes. These processes obscure the insertions of a further pair of setae.

Legs: Apodemes III not united medially; preceded by scaly cuticle bearing usual three pairs of setae. Legs III unexpanded, with four movable segments. Basal and penultimate movable segments each with single seta. Tarsus III with six short setae and much stronger subapical seta. Apodemes IV arched, and united medially in short longitudinal rod; flanked by four setae. Legs IV slightly incrassate; three basal movable segments without setae. Tarsus IV with about five setae, and about three blunt subterminal processes. Caruncles III and IV not reduced.

CYSTOSTETHUM MOSCHATI, n. sp. (Fig. 59).

Types: Holotype male and allotype female in Queensland Museum, Brisbane, and two paratype females in British Museum (Natural History), London. All specimens are in Hoyer's medium, and were collected from musk rat-kangaroos, *Hypsiprymnodon moschatus* Ramsay (Macropodidae), rain-forest, Dinner Creek, near Innisfail, north Queensland, 30.vi.1960 and 4.viii.1960, J. L. Harrison.



Text-figs 59-62.—*Cytostethum* and *Austrochirus* spp. 59, *C. moschati*, n. sp., Lateral view of male, all tarsi appear somewhat foreshortened; 60, *C. pseudocharactum* Domrow, Venter of male; 61, *A. queenslandicus* Womersley, Caudal lobe of male, amended; 62, *A. mcmillani*, n. sp., Caudal lobe of male.

Male.—A well sclerotized, very elongate species; length of body including capitulum 544μ. Capitulum, legs I and II and clasping apparatus typical of subfamily. Only the posterior pair of striate clasping organs are visible in lateral view, but these are preceded by a pair of setae and the anterior pair of claspers. Postcapitular shield apparently simple, followed immediately by two broader shields of characteristic texture. The first of these additional shields carries the usual four postcapitular setae, and is punctate centrally. The second additional shield carries a single pair of setae, and is punctate except for a clear patch in the upper anterior angle. About five minute sclerotizations follow along the middorsum. Opisthosoma strongly annulate,

with about 22 annulations, the posterior few of which are serrate. Four pairs of setae are present laterally, while the genitalia and anus are flanked by a further seven pairs. Genitalia set well behind legs IV, elongate, and as figured. Anus terminal, with two internal sclerotized rods.

Legs: Apodemes III typical, preceded by usual three pairs of setae (the most dorsal pair is the pair on the second additional shield), and with four setae between them. Legs III with four movable segments, the penultimate one of which bears a short seta. Tarsi III elongate, with about five weak setae, and a very strong seta dorsobasally. Apodemes IV typical, with two setae between them. Legs IV somewhat enlarged. Three basal movable segments without setae. Tarsi IV with about five weak setae, a stronger dorsobasal seta, and a subapical process. Caruncles III and IV not reduced.

Female.—Very similar to male, but with relatively larger opisthosoma. Length of body (including capitulum) 602μ. About the same number of annulations are present as in the male. Legs III and IV not enlarged. Tarsi III and IV with dorsobasal seta not enlarged, and similar to other tarsal setae.

Notes.—The preceding three new species are placed in the genus *Cytostethum* with some hesitation. Apart from the two members of the *perkinsi* group (genus *Austrochirus*, see Domrow, 1960*a*), the males of nine other atopomeline species from phalangeroids are now known. These belong in the genera *Campylochirus* Trouessart, 1893, *Cystostethum* Domrow, 1956*a*, and *Atellana* Domrow, 1958*b*. All these forms show wide variation in dorsal shield pattern, but have remarkably similar posterior legs in the male. Thus legs III are simple as in the female, while legs IV are greatly modified and enlarged. This character they share with the *perkinsi* group. The following five points should therefore be considered in allocating the above three new species:

1. The new species have macropodid hosts, as do the known species of *Cytostethum*.

2. The *perkinsi* group is at present quite homogeneous, and restricted to phalangerids.

3. I have recently had two series of atopomelines from *Thylogale* (Macropodidae), the type host genus of *Neolabidocarpus* Gunther, 1942, but have been unable to identify the one described species. I am, however, reasonably certain that its males will prove to have legs as described above.

4. The genera *Campylochirus* and *Atellana* each contain a single characteristic species parasitic on phalangerids.

5. Still another monotypic listrophorid genus, *Chirodiscus* Trouessart and Neumann, 1890, will probably prove to be an atopomeline from Australia.

Thus the course likely to cause least confusion is to take a broad view of *Cytostethum*, and to leave the other groups as compact as possible.

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